Adjustable table or Astronomy explained and practical desfinitions given to the Navigator.

The true Navigator Astronomically, Mathematically, & Mechanically defined. This devise of rotary motion, of the plane of the Earth to the plane of the Sun, by the true light and dignity of Natures law, enables the Mariner to see the true Philosophy of obtaining a Ships position on any part of the Globe visible to the heavenly bodies in a Solar Year. The Phenomena of the changes of the seasons and the changes of the Moon, and its magnetic phenomenon as a fixed law by the Positive and Negative forces as seen, are unchangeable in their law of action to the Sun and Earth. The whole field of declination is spread out, and the true method of Zenith distances and Altitudes explained, by references contained and worked out in this devise, for obtaining latitude by Sea or Land. The object of this little diagram is to show the mechanical form of finding a ships latitude by the use of a proper Instrument to measure the distance of a Heavenly body either north or south of the Earths Equator by Altitude and Zenith distance without reference to Horizon Refraction or Horizontal paralax and by finding a correct declination on a given day. The — Latitude is found by simply adding or subtracting the — declination from the Zenith distance.

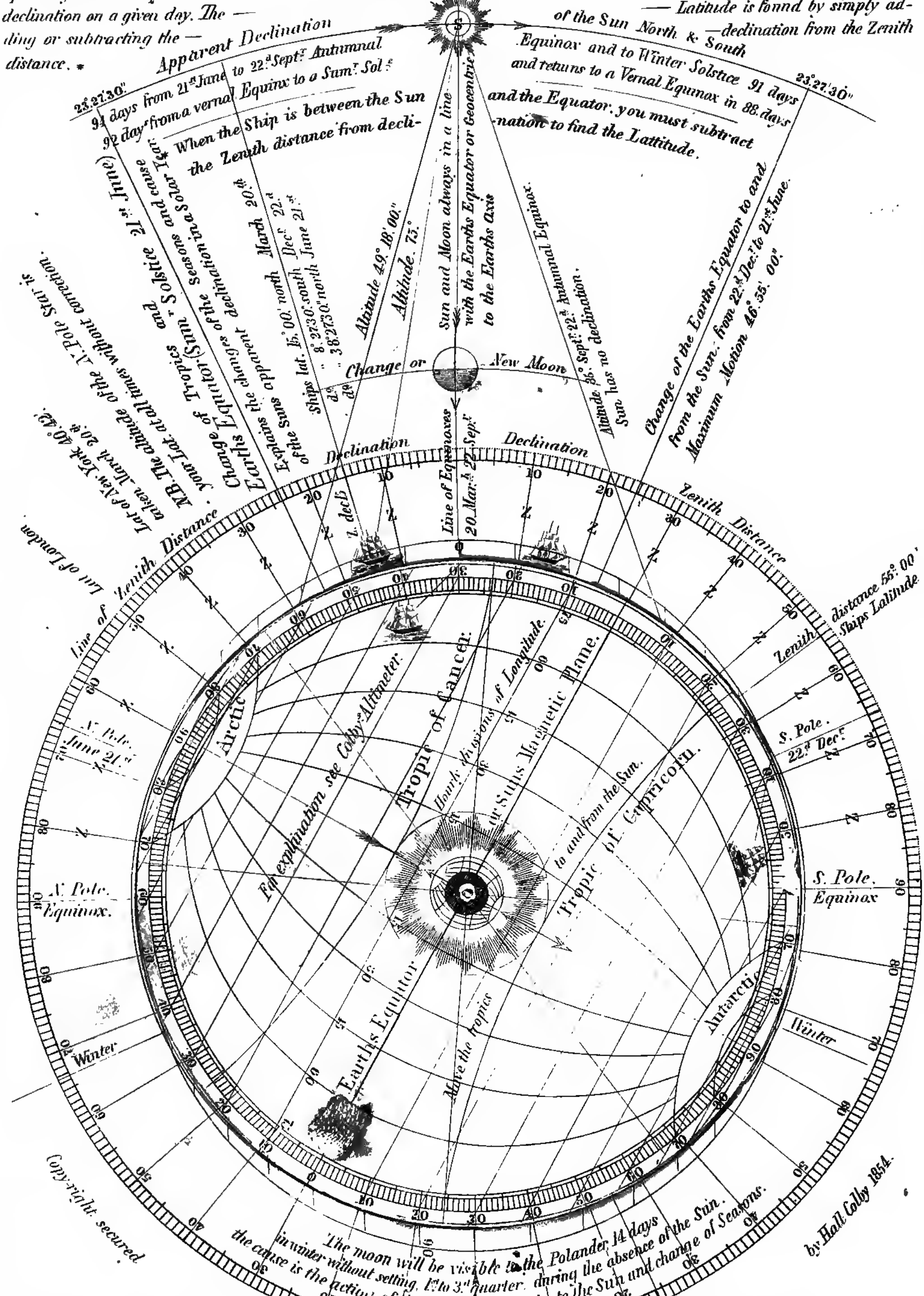


Plate III.

Total Eclipse of the Moon

March 20th 1867 3h 45m A.M.

THE

IMPROVED

NAUTICAL ALMANAC,

OR

TRUE NAVIGATOR,

Astronomically, Mathematically, and Mechanically Arranged,

BY WHICH

THE TRUE MOTIONS OF THE EARTH AND PLANETS TO THE SUN ARE DEMONSTRATED, AND THE REVOLUTIONS OF THE SEASONS IN A SOLAR YEAR ACCURATELY DEFINED, FROM WHICH ARE OBTAINED THE UNDEVIATING RULES FOR FINDING LATITUDE AND LONGITUDE, AT SEA OR ON LAND.

ILLUSTRATED BY ENGRAVINGS,

SHOWING THE

True Position of the Earth and Planets at their Equinoxes and Solstices, by Plates I. and II.,

And their Rotation and Declination, by Plates III. and IV.

Plate V. Demonstrates Local Attraction and the Laws of Atmospheric Electricity.

Plates VI., VII., and VIII., the Eclipses for the Years 1859, 1860, and 1861.

BY

HALL COLBY.

NEW YORK:
PUBLISHED BY THE AUTHOR.
1859.

STEREOTYPED AND PRINTED
BY C. A. ALVORD,
15 Vandewater-st., New York.

TESTIMONIALS.

JANUARY, 1859.

THE undersigned have examined HALL COLBY's Compend of Astronomy and Navigation; we consider his method of illustration both new and useful, in a practical point of view, giving polarity and order, physically and mechanically, to the motions of the earth, and planets to the sun. We recommend his Magnetic Theory of the polarity of the heavenly bodies to the consideration of all institutions of learning, testing their claims as set forth in his orrery, and in his plates and engravings—the nautical portion being for three years. We believe it will be found fully competent for the purposes of obtaining latitude and longitude at sea—the whole being designed for practical use and not for speculation. We are glad to see this work put in the way of distribution.

HENRY EAGLE,
Captain U. S. N.

CHARLES BOGGS,
Commander U. S. N.

JOSEPH J. COMSTOCK,
Merchant Steam Marine.

H. S. KNIGHT,
Ship "New World."

R. K. CORNING,
Bark "Benefactor," China Trade.

W. L. HUDSON,
U. S. Navy.

JOS. H. TOONE,
Ship-Master.

CAPT. S. M'GOWAN,
Steamship "Illinois."

WM. OTTIWELL,
First Officer "Kathay."

CAPT. JAMES HALL,
Late of Russian Steam Corvette, "Japanese."

HALL COLBY'S MAGNETIC ORRERY,

AND ITS CLAIM.

The Author published his Map of the Solar System in 1846; in this map he claimed the discovery of the Magnetic Polarity of the Heavenly Bodies, and their magnetic affinity to the Sun, in the mechanical arrangements of their polar forces, and their polar position at the Equinoxes, Solstices, and their Eclipses, changes of the Moon, &c. All of which were definitely arranged in his Map in 1846; and in 1847 the Magnetic Orrery was constructed and exhibited to prove the Law of Action, as claimed in the Map, to be a negative and positive force or law.

The adjustment of the Magnetic Orrery is simply to adjust the magnetic needle N. and S., causing the circle or wire to have a N. E. and S. W. direction across the gilt ball, representing the Sun and Sun's equator. The engraving on the base on which it stands, shows the Earth at the Equinoxes and Solstices, and its maximum changes and angles of the poles, and consequent change of seasons.

The suspended globe representing the Earth, being put on the hook or pivot, will, by being moved carefully from a west or winter solstice to a summer solstice, on the east side of the Sun, pass across the Sun's equator, giving a Node of the Sun and Earth, and constitutes a vernal equinox. By this device magnetically arranged the peculiar and wonderful law of the planetary system may be seen, negatively and positively worked out.

By this device is also illustrated the universality and sovereignty of that law which is called *positive* and *negative*, or which may be otherwise designated as *oxygen* and *hydrogen*, known to be the inherent property of *matter*—and more definitely proved by means of chemical analysis, to be the inherent property of *water*.

The following testimonials are from men of more than ordinary talent:

COLLEGIATE INSTITUTE, ROCHESTER, 1846.

The Plan or Map of the Solar System, by Hall Colby, is finely adapted to present to the eye of the learner in Astronomy clear and distinct views of the distances, revolutions, eclipses, &c., of the heavenly bodies. If it shall be used in connection with a globe, it will only become a more important auxiliary in the hand of the teacher, in communicating a great amount of interesting and important knowledge. CHESTER DEWEY, President.

Having examined Hall Colby's Magnetic Orrery, Chart, &c., of the Solar System. The Orrery is a rare invention, and may be so considered by any navigator or teacher of science, it having the capacity of exemplifying nature, or the natural phenomena of Astronomy. By the Orrery may be seen and illustrated the complicated motions of the Earth in her seasons. It also defines most beautifully the nodes of the Sun and Earth at the Equinoxes, and defines their position of axes and planes, solstices, &c. In short, all the mechanical order of the solar system seems to be the gift of the Orrery. The magnetic arrangements combined give it a force superior to any thing I have ever seen. The instrument being so lucid, I think a vast amount of correct knowledge may be obtained by its introduction to all seminaries of learning. WM. L. HUDSON, U. S. N.

February 18th, 1854.

The undersigned has cursorily examined Colby's Magnetic Orrery and Chart of the Solar System, and is of the opinion that they justify the recommendations given of them by Captain Hudson and Professor Dewey. HORACE WEBSTER.

FREE ACADEMY, N. Y., 21*st February*, 1854.

Having examined Mr. Colby's Map and Magnetic apparatus, I am free to say that I fully coincide in the opinions of their utility in a practical point of view, as expressed by Captain Hudson. T. STRONG,

Professor of Mathematics and Natural Philosophy in Rutger's College.

TRENTON, NEW JERSEY, *June*, 1858.

HALL COLBY—DEAR SIR: I have examined with much attention and interest your *Magnetic Orrery*, designed to illustrate the physical laws of the planetary system.

If your opinions as to the sublime theory of the polarity of the Sun and Earth and Moon, and of the Planets and Comets, are correct and can be sustained—and the workings of your Orrery certainly go very far toward establishing their correctness—then it will settle one of the most profound principles in nature, and your discovery will constitute one of the most important made in Astronomy for the last three thousand years.

Wishing you all success due to your long and indefatigable labors, I subscribe myself,

Your friend,

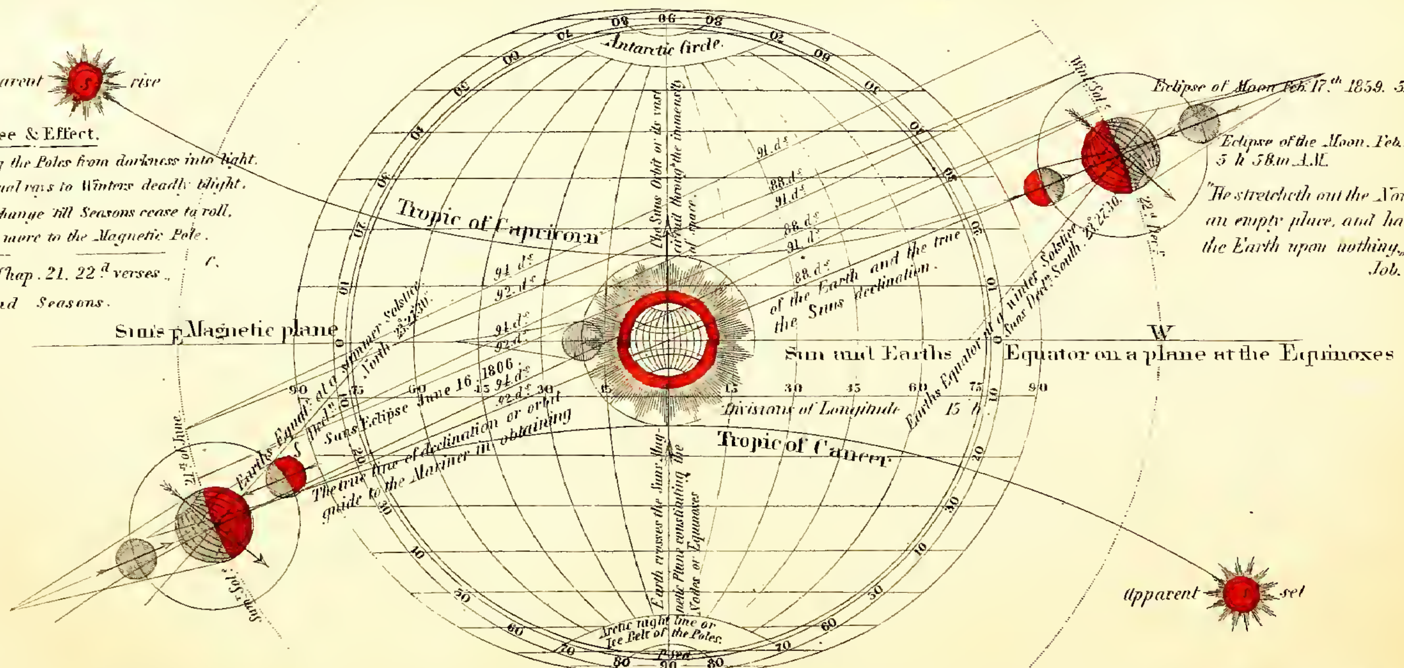
F. W. PHELPS,

Principal of the New Jersey State Normal School.

Plate I.

The Engraving here presented has its claims in a twofold sense, the 1st is Mech.l the 2d the Physical, or the Law of Attraction.

By this plate, the true law of Mechanics, as a Law of God, constituted in Nature, and upon which the whole Solar System rests, and by which it first rose out of Chaos—The law of Positive and Negative forces being a Physical, and Mechanical law of Matter. The duplicated Orbits show the Earths true motion round the Sun, and the cause of Changes and Seasons; the evidence of the Suns projectile course in the Heavens, and the vastness of her orbit compared with all other known bodies, measures and explains the Precession of Equinoxes, and the four quarters of the Solar Year: by the extra lines of the Earths Orbit may be explained the difference in time, or number of days occupied in each quarter of the year; to wit: from the 21st of June to the 22d of Sep.r is 94 days, nautical time, and to the 22d Dec.r Winter Sol.s is 91 days, and from this to a vernal equinox March 20th is 88 days, and to the 21st of June, Summer Sol.s is 92 days, total 365 days or a Solar Year.



Cause & Effect.

Profoundly silent swing the Poles from darkness into light.
From Summers vernal rays to Winters deadly blight.
Repeating change on change 'till Seasons cease to roll.
And light returns no more to the Magnetic Pole.

See "Gen. 8th Chap. 21. 22d verses."
Change and Seasons.

"He stretcheth out the North over an empty place, and hangeth the Earth upon nothing."
Job. 26th 7th

•N.B. By tracing the Earths Orbit and noticing the points of contact with the Suns line of Orbit and N by the number of days set down to each return of the Earth to a Node or Equinox, you see the force or position of time to each quarter of the Year. Admitting the position of the above to show the mechan.l form of the Earth in her Orbit, it causes the known difference between the two Solstices to be about 7 days. The cause is a clear mechanical effect and no mystery; but takes off the veil from Astronomy, and clearly teaches the great law of electromagnetic forces as a first law of Matter and Manner, by which force the Planetary as well as all other Systems are controled. And by the position of the Poles of the Earth and the Poles of the Moon all the phenomena of Changes and Seasons are clearly accounted for. The Earths Poles are immersed alternately in light and darkness at the Solstices, by which the Suns light travels to & from the Poles, 16°.55'. accounting for distance between the Tropics.

SELECTED MATTER FROM DISTINGUISHED AUTHORS,

AS AN

Introduction to Astronomy and Navigation.

THE term ASTRONOMY, like most terms of science, is derived from the ancient Greek language. *Astronomia*, astronomy, is compounded of *astron*, a star or constellation, and *nomos*, a law, the law of the stars. It may be defined the science which treats of the heavenly bodies.

Astronomy is a science of great antiquity. Its early history has too many allegorical representations to admit of a satisfactory elucidation. It is, however, probable, that some scanty knowledge of this science must have been nearly coeval with the existence of man. The grandeur of the delightful canopy extended over his head, must have attracted the curiosity of the most careless and rude wanderer of the forest, much more of the attentive shepherd. Beside, the most common concerns of life are in some measure regulated by a partial knowledge of astronomy.

Both the Chaldeans and Egyptians claimed a very high antiquity; and equally claimed the honor of being the first cultivators of astronomy. It may not be easy, at this late day, to determine which has the best founded claim. Most authors seem agreed in fixing the origin of this science either in Chaldea or Egypt. The shepherds, who "watched their flocks by night," on the beautiful plains of Babylon, or in the extended vale of the Nile, could not be careless spectators of the varying aspects of the heavens. The tower of Belus was the boast of the Chaldeans. This is thought by some to have been an astronomical observatory. They gloried in their astronomer, Zoroaster, placed by them five hundred years before the destruction of Troy. The Egyptians, with equal ostentation, vaunted of their priests. The colleges of these they considered as the depositories of every species of knowledge. In the monument of Osymandyas, it is said, there was a golden circle of three hundred and sixty-five cubits in circumference, divided into three hundred and sixty-five equal parts, according to the days of the year, with the heliacal rising and setting of the stars for each day. It is proper to state, that, whatever may be thought of the tower of Belus, or the circle of Osymandyas, both the Chaldeans and Egyptians were extremely well situated for astronomical observations, being almost always favored with a pure atmosphere, and a sky of delightful serenity. A very favorable opinion of the Egyptians must be formed from the position which they gave to their pyramids, the faces of these being accurately directed to the four cardinal points of the heavens.

Beside the Chaldeans and Egyptians, the Arabians may justly claim a high antiquity in astronomical knowledge. The land of Uz, famous for the afflictions of Job, was without doubt a district of Arabia. Authors are agreed that the book of Job is very ancient—is unrivaled in antiquity, except, perhaps, by the books of Moses. From the familiar manner in which *Arcturus*, *Orion*, and *Pleiades* are introduced in that book, it may be ascertained that, not only were names given to some of the stars, but constellations had been designated and named, so as to become objects of general notoriety.

Among other relations of this kind may be reckoned what is mentioned by Josephus in his Antiquities, who, in speaking of the progress that had been made in astronomy by Seth and his posterity, before the deluge, asserts that they engraved the principles of the science on two pillars, one of stone and the other of brick, called the pillars of Seth; and that the former of these was entire in his time. He also ascribes to the antediluvians a knowledge of the astronomical cycle of six hundred years, which Mantucla, in his "Histoire des Mathematiques," thinks, with much greater reason, was an invention of the Chaldeans; and that whatever information was possessed by the Jewish annalist, with respect to this memorable period, was probably obtained either from that people, or from some ancient writings which no longer exist.

Astronomy is a science useful and sublime in the highest degree. It is useful, not only on its own account, but as the foundation of other arts and sciences; and sublime, as it elevates the soul above the little objects of this world to scenes of infinite grandeur.

Navigation, as an art or a science, is dependent on the principles of astronomy. The varying compass would not form a sure guide to the mariner on the pathless ocean, were it not for corrections derived from observation on the heavenly bodies. Geography is equally dependent. By astronomy are ascertained the figure and magnitude of the earth. The knowledge of latitude and longitude, the situation and distance of places the most remote, the true bearing of countries in respect to each other, and their magnitude or extension, are most accurately obtained by astronomical principles. But above all, astronomy affords the most enlarged and sublime views of the Creator's works. In the vast expanse of the universe, the astronomer beholds the stars, which bespangle and adorn our canopy, magnified into so many suns, surrounded with worlds of unknown extent, constituting systems multiplied beyond the utmost bound of human imagination, and measured only by the omnipresence of Jehovah; all moving in harmony, in subjection to his omnipotent control. "*The heavens declare the glory of* God, *and the firmament showeth his handy work.*" "An undevout astronomer is mad."

There have been three great systems of astronomy—the Ptolemaic, the Brahean, and the Copernican. The former two, however, though dignified by the name of *systems*, are more properly denominated *hypotheses*.

The Ptolemaic system takes its name from Claudius Ptolemeus, or Ptolemy, who flourished at Alexandria or Pelusium, in Egypt, in the second century of the Christian era, in the reigns of Adrian and Antoninus, the Roman emperors. In this system, the Earth was supposed at rest in the center of the universe, around which the Moon, Mercury, Venus, the Sun, Mars, Jupiter, and Saturn revolved. Above the planets this hypothesis placed the firmament of stars and the two crystaline spheres, all included in the *primum mobile*, giving motion to the whole. Still higher, according to some, he conceived, was placed the *empyrean heaven*, or heaven of heavens; all revolving round the Earth, from east to west, in twenty-four hours, according to the ideas of the illiterate in all ages.

The different phases of Mercury and Venus, their superior conjunctions without oppositions, and the apparent retrograde motion of all the primary planets, show the absurdity of this hypothesis.

Tycho Brahe was a native of Sweden, being born at Knudstorp, in the year 1546; though, from education and residence in Denmark, considered a Dane. This celebrated astronomer was acquainted with the Copernican system, published before his time. But, rejecting some of its most simple principles, because he thought them irreconcilable to the literal meaning of some texts of Scripture, he adopted some of the greatest absurdities of Ptolemy, in other respects making his system agree with the rules of modern astronomy.

In his system the Earth is supposed at rest, the Sun and Moon revolving round it as the center of their motion, while the other planets revolve around the Sun, and are carried with it about the Earth.

By this hypothesis the phases of Mercury and Venus may be explained. But no satisfactory explanation can be given by it of the opposition of the superior planets. Both the Ptolemaic and Brahean systems are contrary to the modern principles of calculating and projecting eclipses.

The Copernican system is now universally adopted by astronomers as the true *solar system*. Some of the ancient Egyptians discovered the revolution of Mercury and Venus round the Sun. The general principles of the system were afterward taught privately by Pythagoras to his disciples, five hundred years before the Christian era. But, being afterward rejected, it was nearly lost, till revived by Copernicus, a native of Thorn, in Polish Prussia. In the center of this system is placed the Sun, around which the primary planets revolve from west to east. The Earth turns on its axis. The Moon revolves round the Earth. The other secondary planets perform their revolutions around their primaries from west to east, at different distances and at different times, the satellites of Herschel only excepted. Beyond these, at an immense distance, are the fixed stars, as centers to other systems.

Some authors inform us that Copernicus finished his great work in 1530; but did not venture it in print till near the time of his death, which happened on the 22d of May, 1543. He died suddenly, by the rupture of a blood-vessel, soon after completing his 70th year, and a few days after revising the first proof of his work.

Copernicus was an accurate mathematician, and applied his useful knowledge to the improvement of astronomy. Perplexed with the epicycles and eccentrics by which Ptolemy attempted to account for the irregular motion of the heavenly bodies, he searched the lore of antiquity. "He tried to find among the ancient philosophers a more simple arrangement of the universe. He found that many of them had supposed Venus and Mercury to move round the Sun; that Nicetas, according to Cicero, made the Earth revolve on its axis, and by this means freed the celestial sphere from that inconceivable velocity, which must have been attributed to it to accomplish its diurnal revolution. He learned from Aristotle and Plutarch that the

Pythagoreans had made the Earth and planets move round the Sun, which they placed in the center of the universe. These luminous ideas struck him. He applied them to the astronomical observations, which time had multiplied, and had the satisfaction to see them yield, without difficulty, to the theory of the motion of the Earth. The diurnal revolution of the heavens was only an illusion due to the rotation of the Earth, and the procession of the equinoxes is reduced to a slight motion of the terrestrial axis. The circles imagined by Ptolemy, to explain the alternate, direct, and retrograde motions of the planets, disappeared. Copernicus only saw in these singular phenomena the appearances produced by the motion of the Earth round the Sun with that of the planets; and he determined, hence, the respective dimensions of their orbits, which till then were unknown. Finally, every thing in this system announced that beautiful simplicity in the operations of nature, which delights so much when we are fortunate enough to discover it. Copernicus published it in his work "On the Celestial Revolutions." Not to shock received prejudices, he presented it under the form of an hypothesis. "Astronomers," said he, in his dedication to Paul III., "being permitted to imagine circles to explain the motion of the stars, I thought myself equally entitled to examine, if the supposition of the motion of the Earth would render the theory of these appearances more exact and simple."

A DEFINITION OF ASTRONOMICAL TERMS.

Altitude is an arc of a vertical circle intercepted between the center of a heavenly body and the horizon.

Amplitude is the distance of a heavenly body from the east or west point of the horizon, measured on an arc of that circle, the body being in it, or referred to it by a verticle.

Antipodes, inhabitants living at opposite points of the Earth's surface, under opposite meridians and in opposite parallels.

Antœci, inhabitants living under the same meridian, but in opposite parallels, north and south.

Aphelion, the point in the orbit of a planet farthest distant from the Sun.

Apsis, the aphelion or perihelion point. The line connecting these is called the *line of the apsides.*

Arc of a circle, a part or portion of the circumference.

Asteroids, four small planets between Mars and Jupiter.

Axis, an imaginary line on which the Sun or a planet revolves.

Azimuth, the distance of a heavenly body from the north or south point of the horizon, when the body is in that circle, or referred to it by a verticle.

Centrifugal force, that by which a revolving body endeavors to recede from the center of its motion.

Centripetal force, that which attracts a revolving body to the center.

Comet, a celestial body moving round the Sun in an orbit very eccentric.

Conjunction, the meeting of heavenly bodies in the same longitude, on the same side of the Earth, though they may not be in the same latitude.

Constellation, a number of stars contained in an assumed figure.

Cosines, *cotangents*, and *cosecants* are sines, tangents, and secants of the complement of an arc.

Cycle, a period of time.

Declination, the angular distance of a heavenly body from the equator.

Dichotomized, divided into two parts.

Disk of the Sun or a planet, the hemisphere presented to an observer appearing like a plain circle.

Eccentricity, the distance in a planet's orbit between one of the foci and the center.

Eclipse, a partial or total obscuration of a heavenly body.

Ecliptic, a great circle in which the Earth performs its annual revolution round the Sun, or in which the Sun appears to revolve round the Earth.

Elongation, the angular distance of a heavenly body from the center of its motion; as a planet from the Sun, or a secondary from its primary.

Epact, the excess of the solar above the lunar year of 354 days, or twelve mean lunations.

Equator, a great circle of the Earth drawn round the center from east to west.

Equinox, a point in the ecliptic where it is cut by the equator. There are two equinoxes, the vernal and the autumnal.

Focus, a point in the elliptical orbit of a planet, round which it revolves.

Foci, the plural of *focus*, two points in the transverse axis of a planet's orbit.

Galaxy, the milky way.

Geocentric motion, the apparent motion of a planet as seen from the Earth.

Gibbous, convex, protuberant; applied to the Moon between the first quarter and the full, or between the full and last quarter; also applied to some of the planets.

Globe, a sphere representing the Earth or visible heavens.

Golden number, a period of nineteen years; the cycle of the Moon.

Heliocentric motion, the motion of a planet as seen from the Sun.

Hemisphere, half of a sphere or globe.

Horizon, a great circle of the Earth, 90° from the zenith of a place, the plane of which divides the Earth into upper and lower hemispheres. This is denominated the *rational* horizon. The *sensible* horizon is the circle which bounds our sight.

Inclination, the angular distance between the orbit of a planet and the ecliptic.

Latitude of a heavenly body, its distance north or south from the ecliptic.

Latitude on the Earth, the distance north or south from the equator.

Libration of the Moon, a periodical irregularity in her motion by which exactly the same face is not always presented to the Earth.

Limits in a planet's orbit, two points farthest distant from the nodes.

Longitude of a heavenly body, its distance on the ecliptic from the first of Aries to the intersection of a secondary passing through the body. It is reckoned eastward 360°.

Longitude on the Earth, the distance east or west from a fixed meridian.

Meridian, a great circle of the sphere, encompassing the Earth from north to south. Half of this is sometimes called a *meridian*.

Nadir, the point in the heavens directly under the observer, and opposite to the zenith.

Nebulæ, telescopic stars cloudy in appearance.

Node, a point at which the orbit of a planet crosses the plane of the ecliptic. The intersection where the planet passes to the north is denominated the ascending node; where it passes to the south, the descending node; *above* being often used for north, and *below* for south, in astronomical terms.

Oblate spheroid, a spherical body flatted at the poles.

Obliquity, inclination, the angular distance of a circle from the ecliptic.

Oblique sphere, a position of the sphere in which the equator and parallels cross the horizon in an oblique direction.

Opposition, opposite part of the heavens. Two bodies are said to be in opposition when their distance of longitude is 180°, though they may not be in the same degree of celestial latitude.

Orbit, the figure described by a planet in its revolution round the Sun, or its primary.

Parallax, the angular difference between the true and apparent place of a heavenly body.

Parallel sphere, a position of the sphere in which the parallels of latitude and the equator appear parallel to the horizon.

Penumbra, the partial shadow of the Moon.

Perihelion, the point in the orbit of a planet nearest to the Sun.

Phases, the different appearances of the Moon, Mercury, and Venus, as the illuminated side is differently presented to a spectator.

Phenomenon, appearance, often a novel appearance.

Phenomena, plural of *phenomenon*.

Planet, a heavenly body revolving round the Sun, or some primary planet.

Plane of a planet's orbit, that imaginary surface in which it lies, or a supposed even surface between every part of its circumference.

Polar circles, two circles drawn round the Earth from east to west, parallel to the equator, about 23° 28′ from the poles.

Poles of a planet or the Sun, the extremities of its axis.

Precession of the equinoxes, their retrograde motion in the heavens.

Primary planets, those which perform their revolutions immediately round the Sun.

Projectile force, that which impels a body in a right line.

Quadrature, a quarter, a point in the celestial sphere 90° from the Sun.

Quadrant, the fourth part of a circle.

Radius, a right line from the center of a circle to the circumference.

Refraction, the turning of a ray of light from a straight course.

Retrograde motion, apparent motion from east to west.

Right angle, 90°. When a line falls on another line, making the angles on each side equal, each is a right angle.

Right ascension, the distance of a heavenly body from the first of Aries on the equator, or referred to that circle by a secondary. It is reckoned from the first of Aries to the point where the secondary, passing through the body, cuts the equator.

Secondary planets, satellites, or moons, small planets revolving round some of the primary planets.

Secondary to a great circle, a great circle crossing it at right angles.

Sidereal revolution, the time of a planet's revolving from a star to the same star again.

Sine, a line drawn from one end of an arc perpendicular to the radius.

Solstices, two points in the ecliptic, 90° from the equinoxes.

Star, a luminous heavenly body shining by its own light.

Synodical revolution, the time intervening between the conjunction of a planet with the Sun, and the succeeding conjunction of the same bodies.

Syzygy, the conjunction or opposition of a planet with the Sun, as the change or full of the Moon.

Tangent, a right line touching the circumference of a circle perpendicular to the radius.

Tide, the alternate ebbing and flowing of the sea.

Transverse, the longest axis of an ellipse.

Tropical revolution, the time intervening between a planet's passing a node and coming to the same node again.

Tropics, two circles parallel to the equator, at the distance of about 23° 28′.

Twilight (*crepusculum*), the partial light before sunrise in the morning and after sunset in the evening.

Vector radius, a line from a planet, in any part of its orbit, to the Sun.

Vertical circles, circles cutting the horizon at right angles, and passing through the zenith and nadir of a place.

Zenith, the point in the heavens directly over the observer. The zenith and nadir are the poles of the horizon.

Zodiacal light, a pyramid or triangular beam of light, rounded a little at the vertex, appearing before the twilight of the morning and after the twilight of the evening.

Zodiac, a broad circle in the heavens between two lines on each side of the ecliptic, and parallel to it at 8° distance.

Zone, literally a belt or girdle; a large division of the Earth's surface.

CHARACTERS.

PLANETS.

☿	Mercury.	⚳	Ceres.
♀	Venus.	⚴	Pallas.
⊕	Earth.	♃	Jupiter.
♂	Mars.	♄	Saturn.
⚶	Vesta.	♅	Herschel.
⚵	Juno.		

SIGNS.

♈	Aries.	♎	Libra.
♉	Taurus.	♏	Scorpio.
♊	Gemini.	♐	Sagittarius.
♋	Cancer.	♑	Capricornus.
♌	Leo.	♒	Aquarius.
♍	Virgo.	♓	Pisces.

S	Sign.
°	Degree.
′	Minute.
″	Second.
‴	Third.
=	Equality.

ASTRONOMY GENERALLY;

OR,

THE SOLAR SYSTEM.

The Sun with his attendant planets and comets constitute the *solar system.*

Conceive a large gilt ball suspended in open space, with several smaller balls moving around it from west to east, at different distances and with unequal velocity; imagine those nearest the large ball to have the swiftest motion, and that the movement of the others is more and more slow as you pass to those most remote; imagine further, that several of the revolving balls have others moving round them, and carried with them, or round the central ball, and that all these motions are perpetual, and you will have some imperfect idea of the *solar system.* The idea will be more complete, if occasionally a ball with a fiery train, or tail, be conceived moving with great velocity in a direction nearly to the central ball; but that, passing round this, it recedes with retarded motion, the train increasing as it draws toward the center, and diminishing as it recedes.

It is important that every instructor in astronomy should be furnished with an orrery. To give a clear view of the whole, as suspended and revolving in infinite space, is an object deserving the assiduous care of the well-informed teacher.

Of the Sun.

The Sun is the great source of light and heat to the bodies of the solar system. It is an object pre-eminent—of inconceivable utility and grandeur. Diffusing its rays to an immense distance, and filling a sphere of incomprehensible extent, it gives life and motion to innumerable objects. In some humble measure it resembles its divine Author. The most minute beings are not overlooked; the greatest are subject to his control.

The Sun is considered in the lower focus of the planetary orbits. But if the center of the Sun be considered the focus of Mercury's orbit, the common center of gravity between Mercury and the Sun will be the focus of Venus's orbit; and the common center of gravity between Mercury, Venus, and the Sun will be the focus of the Earth's orbit. Thus the attraction of the planets nearest the Sun will, in a small degree, affect the foci of those more remote. Except the foci of Saturn and Herschel, however, those of all the orbits will not be sensibly removed from the center of the Sun. Nor will the foci of Saturn and Herschel be sensibly different from the common center of gravity between Jupiter and the Sun.

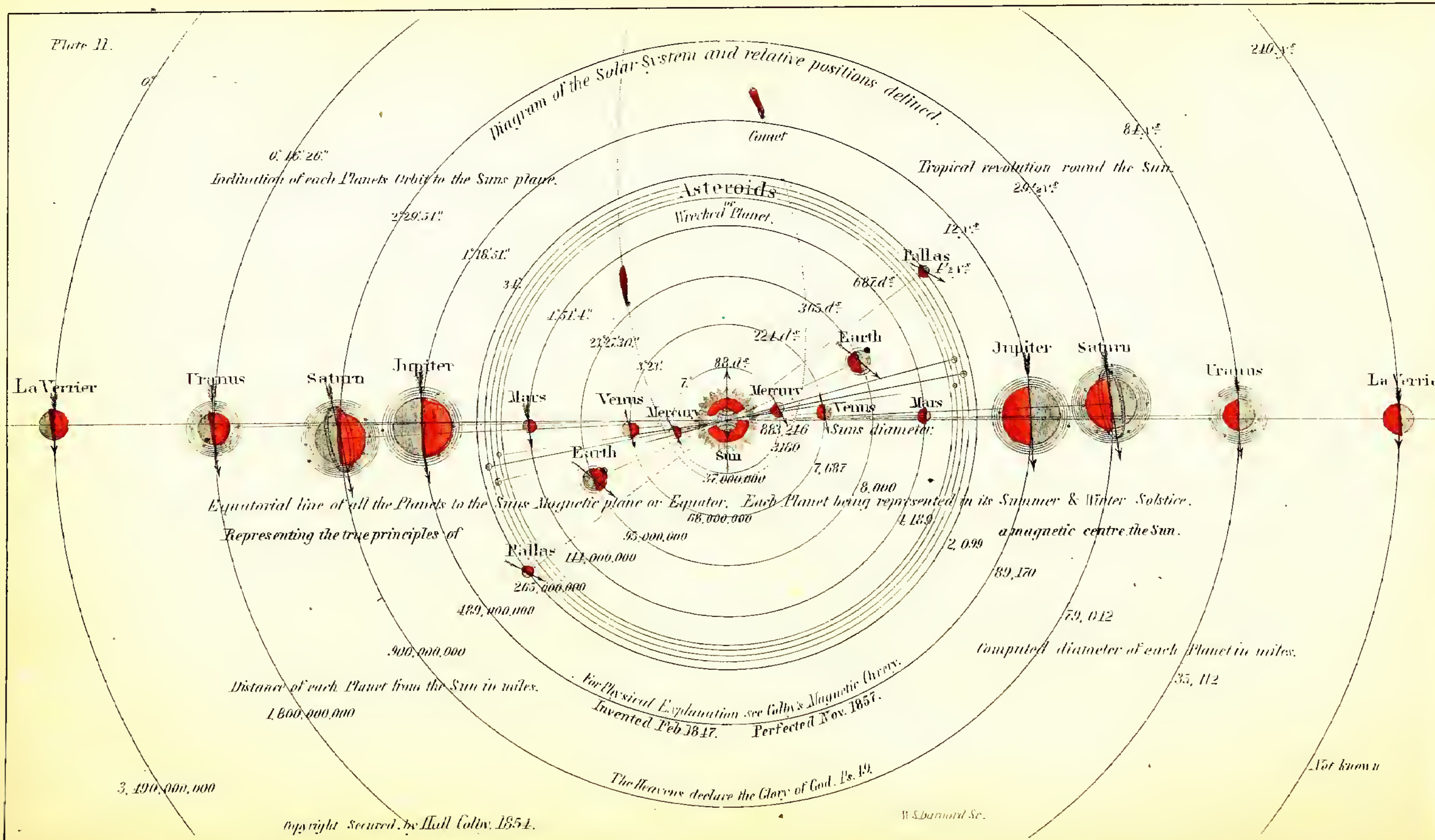


Plate 11.
Diagram of the Solar System and relative positions defined.
Comet
Inclination of each Planets Orbit to the Suns plane.
0° 46' 26"
2° 29' 51"
1° 16' 51"
3° 4'
1° 51' 4"
2° 32' 30"
3° 23'
7°
Asteroids or Wrecked Planet.
Tropical revolution round the Sun.
240 y.
84 y.
29 y.
12 y.
4 y.
687 d.
365 d.
224 d.
88 d.
La Verrier
Uranus
Saturn
Jupiter
Mars
Venus
Mercury
Sun
Earth
Pallas
Suns diameter.
883,246
3160
7,687
8,000
4,189
2,099
89,170
79,012
35,112
Not known
Computed diameter of each Planet in miles.
37,000,000
68,000,000
95,000,000
144,000,000
265,000,000
489,000,000
900,000,000
1,800,000,000
3,490,000,000
Distance of each Planet from the Sun in miles.
Equatorial line of all the Planets to the Suns Magnetic plane or Equator. Each Planet being represented in its Summer & Winter Solstice.
Representing the true principles of a magnetic centre the Sun.
For Physical Explanation see Colby's Magnetic Theory.
Invented Feb. 1847. Perfected Nov. 1857.
The Heavens declare the Glory of God. Ps. 19.
Copyright Secured by Hall Colby. 1854.
W. S. Barnard Sc.

Though stationary in respect to surrounding objects, the Sun is not destitute of motion. It revolves on its axis from west to east in 25 d. 15 h. 16 m., or, according to some authors, in 25 d. 10 h. The Sun's rotation is known from the revolution of its spots.

The form of the Sun is globular. This is demonstrable from its always appearing a flat, bright circle, whatever side is presented to the observer. The diameter of the Sun is 883,246 miles; its circumference, 2,774,897 miles. The Sun is 1,364,115 times larger than the Earth. Thus, surpassing in greatness the globe we inhabit more than one and a third million times, it swells beyond our conception. Some imperfect idea of the immense magnitude of the Sun may be formed by one or two computations. A celestial courier, passing at the rate of forty miles an hour, would be about one hundred and ninety Julian years in circumambulating the Sun. If the Sun were a hollow globe, and the Earth placed at its center, the Moon, at its present distance from the earth, 240,000 miles, might revolve uninterrupted, being but little more than half way from the center to the circumference of the Sun. Such a hollow globe might, therefore, contain within itself a brilliant system of revolving worlds.

The physical construction of the Sun has excited much inquiry and speculation. From time immemorial, an opinion seems to have prevailed that the Sun was a globe of fire. Some say, "The Sun shines, and his rays, collected by concave mirrors, or convex lenses, burn, consume, and melt the most solid bodies, or else convert them into ashes or gas; wherefore, as the force of the solar rays is diminished by their diverging, in a duplicate ratio of the distances reciprocally taken, it is evident their force and effect are the same, when collected by a burning lens or mirror, as if we were at such a distance from the Sun where they were equally dense. The Sun's rays, therefore, in the neighborhood of the Sun, produce the same effects as might be expected from the most vehement fire; consequently, the Sun is a fiery substance." The force of this reasoning would lead us to conclude that, however antiquated or repudiated the opinion may be that the Sun is a globe of fire, its surface must resemble a vast combustion.

But if heat come from the Sun, or the moving cause of heat originate in that luminary, why is it always cold in the upper regions of the air, though nearer the Sun than the surface of the Earth? And why are the tops of lofty mountains covered with perpetual snow, even under the equator? The reply is, that animal heat is generated in the lungs from the oxygen of the atmosphere; that air is a bad conductor of heat, and of course a good defense against cold, or rather preservative of heat, preventing its escape from the body. The more dense the air is, therefore, the warmer is any situation.

The density of the atmosphere is considered as decreasing in a geometrical proportion upward from the surface of the Earth. If the decrease be not always thus proportioned, it is well ascertained by experiments on the tops of lofty mountains, that the air becomes very rare in high regions. Hence the supply of heat from the oxygen of the atmosphere, and the security against cold, or the preservation of heat from the non-conducting power of the air, are greatly diminished. This must affect sensation, and in some degree the thermometer. But this is not the only cause, perhaps not the principal cause, why high regions of the air are cold. According to chemists, all bodies, even those to us the most frigid, radiate heat. Hence, on the common surface of the Earth, not the great mass of the globe only, but other bodies innumerable, with which we are surrounded, supply us with heat. But the elevated observer on the top of Chimborazo or Himalaya is retired, in some measure, above the influence of the Earth and the bodies on its surface. He must exhaust his own treasure of heat, while, except immediately from the Sun, he can receive next to nothing in return. It may be added that heat, or caloric, is by very many considered a fluid put in action by the Sun's rays. If so, it may be confined near the surface of the Earth, or be far short of the atmosphere in height. On the modern theory of caloric, therefore, elevation must greatly diminish, rather than increase the heat.

The highest elevation to which human beings can ascend, though quite a proportion in regard to the height of the atmosphere, vanishes, when compared with the distance of the Sun. What are four or five miles in comparison to ninety-five millions! No mountain is so elevated, no balloon can ascend so high as to make any perceptible difference in respect to the distance of the Sun.

In regard to the ancient theory, it is worthy of notice that the powerful attraction of the Sun is incompatible with its being a mass of *flame* only, and the spots on its surface are conclusive that in part, at least, it must be composed of other matter.

The celebrity of Dr. Herschel, and the ingenuity of his hypothesis respecting the Sun, make this hypothesis deserve some particular consideration. Rejecting the terms *spots*, *nuclei*, *penumbræ*, *faculæ*, and *luculi*, he adopts *openings*, *shallows*, *ridges*, *nodules*, *corrugations*, *indentations*, and *pores*. *Openings*, he says, are those places where, by the accidental removal of the luminous clouds of the Sun, its own solid body may be seen; and this not being lucid, the openings, through which we see it, may by a common telescope be mistaken for mere black spots.

Shallows are extensive and level depressions of the luminous solar clouds, generally surrounding the openings to a considerable extent. Being less luminous than the rest of the Sun, they seem to have some very imperfect resemblance to penumbræ, which occasioned them formerly to be so called.

Ridges are elevations of luminous matter, extended in rows of irregular arrangement.

Nodules are also elevations of luminous matter, but confined in extent to a small space. Those ridges and nodules being brighter than the general surface of the Sun, and slightly differing from it in color, have been called *luculi* and *faculæ*.

Corrugations are a remarkable unevenness or asperity peculiar to the luminous clouds, extending over the whole apparent surface of the Sun. The depressed parts of the corrugations being less luminous than those more elevated, the disk of the Sun has a variegated or "mottled" appearance.

Indentations are the low or depressed parts of the corrugations.

Pores are very small openings about the middle of the indentations.

By a number of observations, he would evince that the appearances, called *spots* in the Sun, are real openings in the luminous clouds of the solar atmosphere.

His next series of observations is adduced to prove that the appearances which have been called *penumbræ* are real depressions or shallows. Following these are others, alleged to show that ridges are elevations above the luminous solar clouds; that nodules are small but highly elevated luminous places; that corrugations consist of elevations and depressions; that indentations are dark places of the corrugations; and that pores are the low places of indentations. He hence infers that the several phenomena, above enumerated, could not appear if the Sun's shining matter were a liquid; since, by the laws of hydrostatics, the openings, shallows, indentations, and pores would instantly be filled up, and ridges and nodules could not preserve their elevation a single moment. But many openings have been known to last during a whole revolution of the Sun; and elevations large in extent have continued for several days. Much less can this shining matter be an elastic fluid of an atmospheric nature; because this would be still more ready to assume a level by filling up the low places. It must, therefore, exist in the manner of luminous, empyreal, or phosphoric clouds, suspended in the higher regions of the solar atmosphere.

"It appears highly probable," says Dr. Brewster, "and consistent with other discoveries, that the dark, solid nucleus of the Sun is the magazine from which its heat is discharged, while the luminous or phosphorescent mantle, which that heat freely pervades, is the region whence its light is generated." The high authority of these men does not free their hypotheses from objection. If the spots are openings only in the luminous clouds of the Sun, why are they stationary for so long a time, except as they partake of the Sun's rotation? and why should heat be emitted from the dark body of the Sun, and not from its luminous mantle, when that mantle has so much the appearance of flame, from which heat is generally diffused on the earth? But investigations into the nature of the Sun must be attended with so much uncertainty that, perhaps, no theory on the subject can be free from objection.

Much light has been thrown upon heat or caloric by the improvements of modern chemistry. But satisfactory conclusions concerning its *nature* cannot be drawn. Lord Bacon considered heat "the effect of an intestine motion, or mutual collision of the particles of the body heated, an expansive undulatory motion in the minute parts of the body." Count Rumford's experiments seemed to show that caloric "was imponderable, and capable of being produced *ad infinitum* from a finite quantity of matter." He concluded, that "it must be an effect arising from some species of corpuscular action among the constituent parts of the body." Other chemists consider it "an elastic fluid."

Mr. Dick, a Scotch author of much ingenuity, in his "Christian Philosopher," has a note on the planet Mercury, deserving consideration. "From a variety of facts, which have been observed in relation to the production of *caloric*, it does not appear probable that the degree of heat on the surfaces of different planets is inversely proportional to the square of their respective distances from the Sun. It is more probable that it depends chiefly on the distribution of the *substance of caloric* on the surfaces, and throughout the atmospheres of these bodies, in different quantities, according to the different situations they occupy in the solar system; and that these different quantities of caloric are put into action by the influence of the solar rays, so as to produce that degree of *sensible* heat requisite for each respective planetary globe. On this hypothesis, which is corroborated by a great variety of facts and experiments, there may be no more sensible heat felt on the surface of the planet Mercury than on the surface of Herschel, although one of these bodies is nearly fifty times nearer the Sun than the other. We have only to suppose that a small quantity of caloric exists in Mercury and a larger quantity in Herschel, proportionate to his distance from the center of the system. On this ground we have no reason to believe either that the planets nearest the Sun are parched with excessive heat, or that those that are most distant are exposed to all the rigor of insufferable cold; or that the different degrees of temperature which may be found in these bodies render them unfit for being the abodes of sensitive and intellectual beings."

This theory of *caloric* is modern and popular; but, like others on the same subject, does not command unqualified assent. If heat be a fluid only, why is it *radiated* by all bodies? and why, reflected, does it pass from object to object in *rays*, a manner so dissimilar to the movement of other fluids? It may be that the learned world must be content, as in attraction, with knowing the operations of heat, without being able to investigate its nature.

Any uncertainty respecting caloric must rest on the physical construction of the Sun, the prime agent of heat in whatever way produced. From what has been said of solar clouds, it must be apparent that some authors consider the Sun surrounded by an atmosphere of vast extent. They ground their opinion principally on the authority of Dr. Herschel, supported by his observations. "The height of the atmosphere he computes to be not less than eighteen hundred forty-three, nor more than two thousand seven hundred sixty-five miles, consisting of two regions; that nearest the Sun being opaque, and probably resembling the clouds of our Earth; the outermost emitting vast quantities of light, and forming the apparent luminous globe we behold."

Harriot, an Englishman, or Fabricius, a German, first discovered the spots on the Sun about the year 1610. According to some authors, they were first seen by Galileo or Scheiner. An account of his observations of them was published by Fabricius in 1611. The spots are various in shape and magnitude. Some have been observed large enough to cover the whole eastern continent, Europe, Asia, and Africa; some to cover the surface of the whole Earth; and one was observed by Dr. Herschel, in 1799, computed to be more than fifty thousand miles in diameter. In most of them there is a very dark nucleus, surrounded by an umbra, or fainter shade. A distinct and well-defined boundary intervenes between the umbra and nucleus. The part of the umbra nearest the dark nucleus is generally brighter than that portion which is more distant.

A spot on the Sun appears at the Earth to perform a revolution round the Sun from west to east in a little more than twenty-seven days—a period longer than the time in which the Sun revolves on its axis. The excess is occasioned by the motion of the Earth in its orbit. The spots on the Sun are generally confined to a zone extending about 35° each way from the solar equator. None have been seen nearer the poles than the solar latitude of 39° 5′.

The Sun rarely appears pure and unsullied by spots. Sometimes, however, none are seen on his disk for several years in succession. From the year 1676 to the year 1684, not a single spot was seen on the Sun.

Of Mercury.

Mercury is the planet nearest the Sun—so it is still considered, after the most accurate modern discoveries. It shines by a very brilliant and white light; but the short period in which it can be viewed, and the position of its body seen through the mists of the horizon, have prevented important discoveries being made on its surface. Of all the planets Mercury is the most swift in its motion. On this account the name was given to it by the ancients, after "the nimble messenger of the gods." It was "represented by the figure of a youth with wings at his head and feet; whence is derived ☿, the character by which it is commonly represented." So great is the velocity of this planet, that it performs more than two revolutions to one of Venus, and, commencing at a conjunction, would pass the Earth three times before it would complete a period, the synodic revolution of Mercury, as seen by us, being 115 d. 21 h. 3 m. 34 s.

The mean diameter of the Sun, as seen from Mercury, is 1° 22′. His mean distance from the Sun is to that of the Earth about as 4 to 10.3. The intensity of the light and heat of the Sun at Mercury must be about as 6.6 to 1 at the Earth, being inversely as the squares of the distances.

The heat of the Sun at Mercury was found, by Sir Isaac Newton, sufficient to make water boil. Hence, beings constituted like the inhabitants of this Earth, cannot endure the climate of Mercury, if Sir Isaac was right, and the degree of heat be in proportion to the proximity of the planet to the Sun. But, from what has been before considered, the circumstances of caloric and atmosphere may be so diversified; they may be so rare at the surface of Mercury, as to render the climate of this planet not only tolerable, but salubrious—a comfortable abode for animal life. This, however, we know, that, with infinite ease, the Deity could form constitutions suited to any situation or climate, destined by him for the creatures of his care.

The surface of Mercury contains nearly thirty-two millions of square miles. It may therefore sustain a population far more numerous than the present inhabitants of the Earth.

According to Dr. Herschel, Mercury is equally luminous in every part of his body, having neither dark spots nor uneven edge, but a disk well defined in every part. Mr. Schroeter, on the contrary, pretends to have discovered in this planet not dark spots only, but mountains. On the authority of the latter observer rests the discovery of a revolution of Mercury on his axis.

ELEMENTS OF MERCURY.

Diameter, 3,180 miles.
Mean diameter, as seen from the Sun, 16″.
Inclination of its orbit to the ecliptic, 7° 0′ 1″.
Tropical revolution, 87 d. 23 h. 14 m. 33 s.
Hourly motion in orbit, 110,113 miles.
Diurnal rotation, according to Schroeter, 24 h. 5 m. 28 s.
Mean distance from the Sun, 37,000,000 miles.
Eccentricity, 7,557,630 miles.

Of Venus.

Venus is to us among the most brilliant of the luminaries seen in the nocturnal heavens. She appears west of the Sun from her inferior to her superior conjunction, and, rising before him, is called *Phosphor*, *Lucifer*, or the *morning star*. Appearing east of the Sun from her superior to her inferior conjunction, she sets after him, and is called *Hesperus*, *Vesper*, or the *evening star*. She is in rotation east or west of the Sun about 292 days; but, obscured by his light when near that luminary, she is not visible quite so long. It is said that, before the time of Pythagoras, the morning and evening stars were supposed to be different, and that he first discovered them to be the same.

The apparent motion of Venus round the Sun is retarded by the motion of the Earth in its orbit, both being in the same direction. Her real revolution is performed in 224 d. 16 h. 49 m. 15 s.; her apparent or *synodic*, in 583 d. 22 h. 7 m. 20 s. She appears, therefore, east or west of the Sun longer than the whole time of a revolution in her orbit.

The bright side of Venus is turned nearly or quite toward us at her superior conjunction; but she is then invisible, being near the Sun, or hidden behind his body. When visible, and the illuminated part nearly round before or after that conjunction, she appears small, on account of her great distance.

Venus shines with a light extremely pleasant. Her silver brightness far surpasses that of the Moon, and is unequaled by any of the heavenly luminaries, except sometimes by Jupiter, or by Sirius, the most brilliant of the "starry train." Venus may occasionally be seen in the daytime by the naked eye. The obstruction of her morning and evening light frequently causes shadows, well defined, like those of a new moon.

Dr. Herschel observed spots on Venus. To him she appeared much brighter round her limb than at the intervening line between the enlightened and dark part of her disk. From this he concluded that Venus, like the Earth, had an atmosphere, and that it was more luminous than the body of the planet. The height of this atmosphere, according to the computation of some, is about fifty miles. Such computation, however, ought to be received with great allowance for uncertainty. The surface of the planet being enveloped in her atmosphere may be the reason that so few spots have been seen on her disk.

"Mr. Schroeter," says Dr. Brewster, "seems to have been very successful in his observations upon Venus; but the results which he has obtained are more different than could have been wished from the observations of Dr. Herschel. He discovered several mountains in this planet, and found that, like those of the Moon, they were always highest in the southern hemisphere; their perpendicular heights being nearly as the diameters of their respective planets. From the 11th of December, 1789, to the 11th of January, 1790, the southern hemisphere of Venus appeared much blunted with an enlightened mountain, in the dark hemisphere, nearly twenty-two miles high." He states the result of four mountains measured by him:

First, ...	22.05 miles.	Third, ...	11.44 miles.
Second, . . .	18.97 "	Fourth, ...	10.84 "

The bluntness and sharpness, alternately apparent in the horns of Venus, arise, he supposes, from the shadows of high mountains.

From the changes which appear in her dark spots, and, as inferred by Mr. Schroeter, from the illumination of her cusps when she is near her inferior conjunction, the atmosphere of Venus is considered very dense.

The diameter of Venus has been considered about 220 miles shorter than that of the Earth. But it appears from the measurements of Dr. Herschel that her apparent mean diameter, reduced to the distance of the Earth, is

18″.79, that of the Earth being 17″.3. "This result," says Dr. Brewster, "is rather surprising; but the observations have the appearance of accuracy."

ELEMENTS OF VENUS.

Inclination of her orbit to the ecliptic, 3° 23′ 32″.
Diameter, 7,687 miles.
Mean diameter, as seen from the Sun, 23″.3.
Tropical revolution, 224 d. 16 h. 46 m. 15 s.
Sidereal revolution, 224 d. 16 h. 49 m. 15 s.
Hourly motion in orbit, 79,226 miles.
Diurnal rotation, 23 h. 20 m. 59 s.
Mean distance from the Sun, 68,000,000 miles.

Of Mercury and Venus.

Mercury and Venus are both constant attendants on the Sun; in the one part of their course, being the harbingers of the morning; in the other, brightening the vail of evening with their setting splendor. Often seen in conjunction with the Sun, but never in opposition, they form a demonstration of the truth of the Copernican system.

The *inferior* conjunction of Mercury or Venus is, when the planet comes between the Earth and the Sun, or so near the connecting line between them as the obliquity of its orbit will admit. It is, when referred to the ecliptic, in the same longitude with the Sun, though it may be farther north or south. The *superior* conjunction of either of these planets is, when the planet, in that part of its orbit most distant from the Earth, comes into the same longitude with the Sun. It is then either hidden behind the great luminary, or passes by it on the north or south.

Mercury and Venus are called *inferior* planets, because their orbits are nearer the Sun than the orbit of the Earth.

When an inferior planet is at its greatest elongation, a line passing from the Earth through the planet is a tangent to the planet's orbit. The greatest elongation of Mercury is 28° 20′; of Venus, 47° 48′. The orbit of these planets being elliptical, the greatest elongation on one side of the Sun may not be equal to that on the other side.

Mercury, like Venus, is alternately morning and evening star, though not generally thus known. Like Venus, being west of the Sun from the inferior to the superior conjunction, it rises before him in the morning; from the superior to the inferior, east of the Sun, it sets after him in the evening.

The apparent motion of the inferior planets is greatest at the conjunctions. From the greatest elongation on one side to the greatest elongation on the other, through the superior conjunction, their geocentric motion is direct; through the inferior conjunction, this motion is retrograde. At their greatest elongation, they appear stationary in respect to the Sun. A small part of the orbit nearly coinciding with the tangent line, and the eye of the observer being in that line, the motion of the planet must be either toward such observer or from him, and, of course, must be imperceptible.

The retrograde motion of Mercury, in regard to the fixed stars, does not commence when the planet is at the greatest elongation east, nor does it continue till the planet is at the greatest elongation west of the Sun. For at these greatest elongations, the planet will appear to move forward with the same velocity as the Sun appears to advance by the motion of the Earth in its orbit. The stationary appearance, in relation to a fixed star, must be, when the geocentric westerly motion of the planet counterbalances the Sun's apparent easterly motion.

Venus, like Mercury, has her stationary appearance, her direct and retrograde motion.

We are told by Ryan, in his "Grammar of Astronomy," that "the different phases or appearances of Venus were first discovered by Galileo, in 1611, which fulfilled the prediction of Copernicus, who foretold, before the discovery of the telescope, that the phases of the inferior planets would be one day discovered to be similar to those of the Moon. The accomplishment of this prediction affords some of the strongest and most convincing proofs of the truth of the Copernican system.

One half of each of the planets is illuminated by the Sun. Thus it has been uniformly said by authors. On strict examination, however, it will be seen that a fraction more than a hemisphere is illumined, the Sun being a much larger body than any of the planets. The enlightened side of Mercury and Venus are turned from the Earth at their inferior conjunctions. In these conjunctions, when at or very near their nodes, they appear as dark spots passing over the Sun's disk. At other times, invisible to us, they pass the Sun unobserved. They appear nearly full at their superior conjunctions; but never completely so, as their enlightened side is never turned directly toward us, except at the nodes, when they are hidden behind the body of the Sun.

Of the Earth.

Next to Venus, in the solar system, is the Earth. This is the planet by far the most worthy of our attention; though astronomy forbids us fully to adopt the language of the poet:

> "Through worlds unnumbered, though the God be known,
> 'Tis ours to trace him only in our own."

The Earth affords sustenance to innumerable animated beings which people its surface. It is our habitation in life, and kindly covers our remains when the parting spirit has taken its flight. In its peaceful bosom our dust must slumber, till called forth by "*the voice of the archangel and the trump of God.*"

The Earth is spherical in its form. It is not, however, a complete globe. Elevated at the equator, and flattened at the poles, its form is an oblate spheroid, resembling, in some degree, the well-known English turnip.

Of the rotundity of the Earth any person may satisfy himself. The clouds at a distance appear to rise from the horizon, or to sink below that circle, which they could not do were the Earth an extended plain. If, in a level country, a person travel north for many miles, he will find, by accurate observation, the north star rising, and discover other stars unseen at his former station. If he go south, these stars will be depressed, and southern stars will rise to his view.

The masts and sails of a ship at sea are seen by a spectator on land, when the hull is hidden behind the convex surface of the water. Were the surface level, the hull, being largest, would first appear.

The outline of the Earth's shadow, seen in partial eclipses of the Moon, is circular. This it could not be were not the Earth of a spherical form.

For, as it presents different sides to the Sun in different eclipses, and even in the same eclipse, the outline of the shadow would be different, in conformity to the original.

The spherical figure of the Earth is placed beyond all doubts by its having been many times circumnavigated.

The true form of the Earth, its *spheroidical figure*, was first discovered by the pendulum, a longer line being required to vibrate seconds toward the poles than at the equator. Some diversity in the proportion of the diameters is found in different authors. This is not wonderful in a case requiring so much nicety of observation. The excess of the equatorial diameter over the polar has been stated at twenty-four, thirty-four, and thirty-seven miles. In "Rees's Cyclopedia," the equatorial diameter is reckoned at 7,977, the polar at 7,940, considered by the author but "an approximation to a true estimation." In the "Practical Navigator" of Dr. Bowditch, the diameter is considered 7,964. Thus the mean diameter will be considered in this compend.

The errors of antiquity, of childhood, and ignorance, in considering the Earth an extended plain, or unbounded in its dimensions, are corrected by philosophy. Its true form is now well-known to the scientific world. But the astronomical student is in danger of verging to the opposite extreme. When he considers the Earth as a planet, greatly inferior in magnitude to several wandering orbs of his own solar system—immensely less than the Sun; and the Sun but a speck in the Creator's works—he seems to contract its true dimensions, and to be insensible that still, to its inhabitants, it is a globe of vast magnitude; of which, and its kindred orbs, it may be truly said, "these little things are great to little man." Considering the diameter of the Earth 7,964 miles, the circumference is about 25,020 miles, and the superficial contents, or surface, 199,259,280 square miles.

The *equator* is an imaginary circle encompassing the Earth from east to west; the plane of the circle dividing it into northern and southern hemispheres.

The *ecliptic* is a great circle, in which the Earth performs its annual revolution; or in which the Sun appears to perform an annual revolution round the Earth. It is divided into twelve equal parts, denominated the twelve signs of the ecliptic, each containing 30°: Aries, Taurùs, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, and Pisces.

The plane of the equator is inclined to the ecliptic in an angle of about 23° 28′. (See *Obliquity*).

The division of the Earth's surface into zones is not imaginary, but has a foundation in nature. The *torrid zone* comprehends all that region where the Sun is vertical at any season of the year. The *temperate zones* spread over the whole of the Earth's surface, from the tropics to the extreme limit of continual and successive day and night, the Arctic and the Antarctic circles being drawn at the bound, where the longest day is twenty-four hours. At that bound the Sun does not appear to set at the summer solstice, nor to rise at the winter solstice.

The *frigid zones* are enveloped in light and darkness in alternate succession. The Sun, at its greatest declination north, shines over the north pole to the Arctic circle. The whole northern frigid zone is then illuminated, and, by the diurnal motion of the Earth, revolves wholly in the light. The southern frigid zone, precluded from the Sun's rays, is then involved in entire darkness. When the Sun is in his greatest declination south, shining over the south pole to the Antarctic circle, the southern frigid zone is enlightened; the northern, abandoned by the Sun, is shrouded in darkness. The continuance of light or darkness in the Arctic and Antarctic regions is longer, the nearer any place is to either pole, where the day and the night continue alternately for six months; except the greater prevalence of light from refraction and other causes.

The Earth has three motions: its diurnal rotation on its axis; its annual motion in its orbit round the Sun; and the revolution of its axis round the poles of the ecliptic.

The rotation of the Earth on its axis is performed in 23 h. 56 m. 4 s. or one sidereal day. This is a most uniform motion. By bringing the different parts of the Earth to the Sun in succession, it produces day and night. Given to this Earth, at its creation, by an all-benevolent Creator, it continues a constant return of blessings to his dependent creatures. This motion is from west to east. It causes the apparent revolution of the heavenly bodies in a contrary direction, from east to west.

Different parts of the Earth, in this rotation, move with unequal velocity. Greatest at the equator, it decreases toward the poles, as the cosines of the latitude decrease. A place in Borneo or the Colombian Republic, at the equator, moves about 1,042 miles an hour; Washington city, 811 miles; Boston 770 miles; London, 649 miles; St. Petersburg, 522 miles; an inhabitant of Greenland, in latitude 80°, only 181 miles. When this motion is on the side of the Earth opposite the Sun, it nearly coincides with the immense velocity of the Earth in its orbit. By this motion the centrifugal force of an object near the equator is greater than at any parallel of latitude. This, as well as its distance from the center of gravity, causes objects to be lighter at the equator than near the poles. The farmer and mechanic know that the water on a grindstone, turned swiftly round, rises toward the highest part, and flies off by increased velocity. A similar effect would be produced on the Earth, were the motion sufficiently increased. "If," says Dr. Enfield, "the diurnal motion of the Earth round its axis was about seventeen times faster than it is, the centrifugal force would, at the equator, be equal to the power of gravity, and all bodies there would entirely lose their weight. But if the Earth revolved still quicker than this, they would all fly off."

The circles, which the heavenly bodies appear to describe by this motion of the Earth on its axis, assume a different position as seen from different parts of the Earth's surface; the great concave of the heavens, or *celestial sphere*, changing its appearance, as differently viewed by the spectator.

At the equator the inhabitants have a *right sphere*, all the heavenly bodies appearing to rise and set at right angles to the horizon. The celestial equator passes through the zenith and nadir. The poles are in the horizon.

From the equator to the poles, the inhabitants have an *oblique sphere*. The apparent circles, or circles formed by the apparent motion of the heavenly bodies, are oblique to the horizon; but forming angles with it less as they are farther from the equator; till, at the poles, they become parallel to the horizon, or coincide with that circle. To a person passing from the equator toward either pole, the pole-star of his hemisphere appears to rise, and, at a distance from the equator, the stars, the same distance from his elevated celestial pole, do not set, but appear to revolve in circles greater as they are farther distant from the pole.

The Earth makes a complete revolution round the Sun, or from a star to the same star again, in 365 d. 6 h. 9 m. 12 s. This is called the *sidereal year.* From an equinox or a solstice to the same again, it revolves in 365 d. 5 h. 48 m. 51 s. This is usually called the *tropical year;* but sometimes the *equinoctial or solstitial year.* It is usually reckoned from the first degree of Aries, but may be computed from any other point of the ecliptic. The Earth performs a revolution, from the aphelion of its orbit to the same again, in 365 d. 6 h. 14 m. 2 s.

The mean distance of the Earth from the Sun has been found to be about 95,000,000 miles. This was ascertained by observations made on the transit of Venus, in the year 1761. Prior to these observations, the distance was considered much less. But their accuracy, confirmed by those on the transit of 1769, seems now to command the full assent of the philosophic world. Taking the distance as now reckoned, it makes the diameter of the Earth's orbit 190,000,000 miles, and the circumference 569,902,100 miles, about equal to the elliptical orbit. The earth, moving this immense distance in a year, must travel more than 68,000 miles every hour. All the inhabitants of the Earth are carried at this inconceivable velocity, one hundred and forty times greater than that of a cannon-ball, in their perpetual movement round the Sun. Even this velocity is increased, on a part of each day, by the motion of the Earth on its axis. It may shock the credulity of those who are unaccustomed to philosophical observation, that a motion of such velocity should be imperceptible. But we must take notice, that terrestrial objects around the observer, even the atmosphere, move with him in the same direction; so that with the heavenly bodies only can he compare his motion. By observation on those bodies, the motion of the Earth is ascertained beyond the slightest doubt of the astronomical student. But this motion, if wonderful, is not altogether singular. The passing of a vessel on still water is imperceptible, except from meeting the air, and the apparent motion backward of surrounding objects, till it strikes the shore or other obstruction. No motion on the stillest water is so uniform and even as that of the Earth in its orbit.

The retrograde motion of the axis of the Earth round the poles of the ecliptic causes the difference between the tropical and sidereal years. The equinoxes are annually carried backward, from east to west, 50″.118 in a year. Thus, in every year, they meet the Sun 20 minutes 24.4 seconds before the Earth arrives at the point in the heavens whence it started at the commencement of the year. This retrograde motion is called the *precession of the equinoxes.* With the equinoctial points move all the signs of the ecliptic. "It follows, that those stars which, in the infancy of astronomy, were in Aries, are now in Taurus; those of Taurus, in Gemini. Hence, likewise, it is, that the stars which rose or set at any particular season of the year in the times of Hesiod, Eudoxus, Virgil, or Pliny, by no means answer at this time to their descriptions." An example of the change may be seen on our celestial globes. The constellations are placed 30° from the signs to which they originally belonged. This change of place shows the motion of the equinoxes for 2,154 years. A complete revolution of the signs requires a period of 25,858 years. Hence, the pole-star, or *the north pole,* as it is called, will not always be the point to which the pole of the

Earth will be directed; but in something more than 12,000 years will be about 47° from the pole of the Earth, and when on the meridian will be in the zenith of some parts of New England.

How should the contemplation of these celestial motions and long periods constrain us to improve the short, fleeting moments of time assigned to us; and lead us to admire and adore the wisdom and power of Him who formed and still governs the universe with infinite ease; to whom "*a thousand years are as one day!*"

The Moon.

The Earth has one satellite, the Moon. This constant attendant is distant from the Earth 240,000 miles. The Moon, though inferior to most of the heavenly bodies, next to the Sun is to us by far the most interesting. By dispelling the gloom of night, she is the solace of the weary traveler; and by constantly changing her countenance, she gives variety and beauty to the nightly canopy.

The Moon performs a revolution round the Earth, from a point in the ecliptic to the same again, in 27 d. 7 h. 43 m. 5 s.; from a star to the same again, in 27 d. 7 h. 43 m. 12 s. It revolves from the Sun, to the Sun again, in 29 d. 12 h. 44 m. 3 s. This is called a *mean lunation*, and is a synodical revolution. The Moon always presents the same face to the Earth. Hence in the same time that it performs a revolution, it must revolve on its axis, unless the different sides of the Moon present the same prospect. That there should be a uniformity of appearance in the different sides of the Moon seems very improbable. Astronomers seem agreed in the coincidence of its revolutions; or that it revolves on its axis in the same time that it performs a revolution round the Earth. If this opinion be correct, it must be considered that the side of the Moon next to the Earth is composed of matter more dense than that of the opposite side; and that the powerful attraction of the Earth causes it to revolve on its axis.

Several authors have asserted that the Moon performs a revolution in 29½ days; and, in immediate connection, that it turns on its axis in the same time that it performs a revolution. The latter assertion is true; but it is in the time of the sidereal revolution, 27 d. 7 h. 43 m. 12 s., and not in the synodical, or a lunation, about 29½ days.

The diameter of the Moon is 2,180 miles. But it can be but 2,173 miles if its apparent diameter be 31′ 8″, as stated by De la Lande.

The Moon, like the other planets, is opaque, shining only by the reflected light of the Sun. The side of the Moon which is next to the Sun is enlightened, the other half dark and invisible. Hence, when she comes between us and the Sun, she is not seen, her dark side being then toward us.

When she is advanced a little way in her orbit, a small part of her illumined side becomes visible in the form of a beautiful luminous crescent. This is called the *new Moon*. When she has performed one fourth of a lunation, her illuminated side becomes dichotomized, or one half of the bright side becomes visible. She is then said to be in her *first quarter*. From this time to her opposition, she is said to be *gibbous*, presenting still more of her illuminated side as she moves forward, or becoming more protuberant. When she becomes opposite to the Sun, nearly the whole of her enlightened hemisphere is presented to the Earth. She is then said to be *full;* and is called the *full Moon*. It must be remembered, however, that the bright side of the Moon is never exactly toward us, as she is never directly opposite to the Sun, except in her nodes, when she falls into the Earth's shadow, and is eclipsed. From the full to the change, the Moon passes in a retrograde order through the same phases; first gibbous, then dichotomized in her *last quarter*, then horned, till, coming between the Earth and the Sun, she again becomes invisible.

The dark parts of the Moon attract the attention of the most careless observer. Hence "*the man in the Moon*" is familiar to boyhood, and common to the unlearned. These dark parts were formerly thought to be seas, but are now considered dark cavities not reflecting the light of the Sun.

The light of the Moon is exceedingly soft and cheering; but is little in the extreme compared with that of the Sun. In this authors are agreed. But, from their different modes of computation, they have come to different results, and made considerable difference in the disproportion between the lunar and solar lights. Dr. Hooke, accounting for the reason why the the Moon's light affords no perceptible heat, observes, "that the quantity of light which falls on the hemisphere of the full Moon is rarefied into a sphere, two hundred and eighty-eight times greater in diameter than the Moon, before it arrives at us."

The uniformity of the Moon's visage, or its exhibiting always the same face, is subject to some alteration. Spots on the east and the west, on the north and the south of the Moon, appear and disappear in rotation. The phenomena are produced by the Moon's *librations*. These are of four kinds. The diurnal motion of the Earth on its axis, carrying the spectator farther north or south, causes the *daily libration of the Moon.*

The *libration of the Moon in longitude* is caused by her uniform motion round the Earth.

The *libration of the Moon in latitude* is caused by the inclination of her orbit to the plane of the ecliptic.

The other is a small *libration*, caused by the attractive force of the Earth on the spheroidical figure of the Moon.

Of Mars.

Mars, in distance from the Sun, is next to the Earth in the solar system. The red, fiery color of this planet attracted the attention of the ancients. Hence they gave it the name of their god of war. Hence also it "is usually represented by this character, ♂, which is said to be rudely formed from a man holding a spear protruded, representing the god of war."

Some have thought the color of Mars may arise from his being of a nature suited to reflect the red rays of light. But the prevailing opinion is, that it arises from the extended and dense atmosphere of the planet. The color of a beam of light, passing through a dense medium, inclines to red; the color always being brightened in proportion to the density of the medium and the distance passed. The red, the least refrangible rays, seem more strong and vigorous than the violet, the most refrangible rays. The former will traverse an atmosphere, when the latter will be absorbed or diverted. Hence the ruddy appearance of this planet and of the Moon eclipsed; and hence the beautiful tinge of the morning and evening clouds.

In 1665, Dr. Hooke discovered spots on Mars. From a motion perceived in these, he concluded this planet had a rotation on its axis. In 1666, Mr. Cassini observed spots on Mars. By diligent observation on these, at different times, he ascertained that Mars performed a revolution round his axis in 24 hours 40 minutes.

ELEMENTS OF MARS.

Mean diameter, 4,189 miles.
Mean diameter, as seen from the Sun, 6″.
Inclination of his orbit to the ecliptic, 1° 51′ 4″.
Tropical revolution, 686 d. 22 h. 57 m. 58 s.
Sidereal revolution, 686 d. 23 h. 30 m. 35 s.
Diurnal rotation, 24 h. 40 m.
Mean distance from the Sun, 144,000,000 miles.

Of the Asteroids.

PALLAS.

Pallas, discovered by Dr. Olbers on the 26th of March, 1802, is in magnitude nearly the same as Ceres, but of a color less ruddy. It is surrounded with nebulosity, similar in appearance to that of Ceres, and extended to a height almost equal. In the eccentricity of its orbit, it resembles Juno. Pallas is distinguished from all the other primary planets by the great inclination of its orbit to the plane of the ecliptic, being about 35°; nearly five times the inclination of Mercury's orbit.

Mean diameter of Pallas, according to Herschel, 80 miles.
Mean diameter of Pallas, according to Schroeter, 2,099 miles.
Mean distance from the Sun, 265,000,000 miles.
Inclination of its orbit, 34° 39′ 0″.
Tropical revolution, 4 y. 7 m. 11 d.

Much labor and ingenuity have been employed to show that the Asteroids are but fragments of a larger planet burst asunder by some vast explosion. The hypothesis seems not supported by conclusive arguments. Against it there are strong reasons. The idea itself of such an explosion seems extravagant beyond conception. How vast must have been the force which could throw such bodies from each other to a distance of forty millions of miles; or so as to revolve in orbits forty millions of miles distant! Immense is the explosive force of Hecla, throwing lava or cinders to the distance of one hundred and fifty miles. But how diminutive! How are all the explosions of Vesuvius and Hecla, of Etna and Cotopaxi, annihilated in comparison! Had these Asteroids constituted but one planet since the first attention to the heavenly bodies, it would have been seen by ancient astronomers, being sufficiently large for observation by the naked eye. It would have been enumerated among the planets. It may be added that the vast atmosphere of some of these planets, which would without doubt have been left behind in such an explosion, seems directly opposed to the idea of their having been hurled from a bursting planet.

Of Jupiter.

Beyond the Asteroids, or farther distant from the Sun, is Jupiter, the largest of the planets. Jupiter, next to Venus, is the most brilliant of the planets. He sometimes even surpasses her in brightness. The form of Jupiter is an oblate spheroid, his equatorial diameter being to his polar as 14 to 13.

The character ♃, by which this planet is represented by astronomers, is a zeta, the first letter of his Greek name, *Zeus;* the lower part cut off by a small line drawn across as a sign of abbreviation.

The most remarkable phenomena in the disk of Jupiter are a number of belts or stripes by which he is encompassed. These appear variable at different times, and even at the same time, viewed by telescopes of different powers. Yet they generally appear parallel to each other, and parallel to the equator of Jupiter. In very favorable weather, they sometimes seem formed of a number of curved lines, like the strokes of an engraving. Eight or ten belts have been seen at the same time. The belts have been observed at times of different breadths, and have afterward all assumed nearly the same breadth. Bright and dark spots are frequently visible in these belts. Like the belts, the spots are subject to continual change. When a belt vanishes, the contiguous spots disappear. Some of the spots, however, seem to make periodical returns. The spot first observed by Cassini reappeared eight times between the years 1665 and 1708. In 1713, it again reappeared in the same form and position. In 1780, May 28, the disk of Jupiter was observed by Dr. Herschel covered with small curved belts, or rather lines not contiguous.

Different opinions are formed by astronomers respecting the cause of these appearances. By some they are considered the effect of changes in the atmosphere surrounding Jupiter, while they are regarded by others as indications of great physical revolutions on the surface of the planet. By others, again, it is supposed that the clouds of Jupiter, partaking the great velocity of his diurnal motion, are formed into strata, parallel to his equator, that the clouds reflect more light than the body of Jupiter, and that the belts are the body seen through the parallel interstices of the clouds. "But whatever be the nature of these belts," says Mr. Dick, "the sudden changes to which they are occasionally subject seem to indicate the rapid operations of some powerful physical agency—for some of these are more than five thousand miles in breadth—and, since they have been known to disappear in the space of an hour or two, and even during the time of a casual observation, agents more powerful than any with which we are acquainted must have produced so extensive an effect."

ELEMENTS OF JUPITER.

Mean diameter, 89,170 miles.
Mean diameter, as seen from the Sun, 37″.7.
Inclination of his orbit to the ecliptic, 1° 18′ 51″.
Tropical revolution, 11 y. 314 d. 8 h. 41 m. 3 s.
Diurnal rotation, 9 h. 55 m. 37 s.
Mean distance from the Sun, 490,000,000 miles.

SATELLITES OF JUPITER.

Jupiter is attended by four satellites. They are reckoned the first, second, third, and fourth, beginning with the one nearest to the primary. These satellites were discovered by Galileo on the 8th of January, 1610, and called by him *Medica sidera, Medicean stars,* in honor of his patrons, the family of the Medici.

By some we are told these satellites are not to be seen by the naked eye. But Prior, in his "Lectures on Astronomy," informs us that, "with the exception of the third and fourth, they are never visible to the naked eye; instances of these two being so seen are extremely rare, although they have been known to occur." He tells us, in another place, that, "according to Dr. Herschel, the third is the largest; the second the least; and the first and fourth are nearly of the same size. They are all of them supposed to be considerably larger than the Earth; but their dimensions are not exactly known."

Through a good telescope the satellites of Jupiter present a delightful prospect. They seem generally ranged in a straight line, parallel, or nearly parallel, to his belts. Jupiter and his satellites eclipse each other. Like the Moon, they throw their dark shadows upon their primary; and like her they fall into his shadow, and are eclipsed. These phenomena are a demonstration that those distant luminaries are in themselves opaque, and shine not by their own light, but by rays borrowed from the Sun.

The eclipses of Jupiter's satellites are of great utility to us. By these it is found that light is progressive, which, before their discovery, was supposed to be instantaneous. By them the relative distances between the Earth, the Sun, and Jupiter can be ascertained. But the greatest benefit derived from these eclipses is to geography and navigation. They afford one of the best methods yet known for ascertaining longitude. It could not have occurred to Galileo, when he first discovered these satellites, that by an act so simple he was rendering so great a benefit to mankind. Here is verified the observation of a celebrated traveler, that the Deity everywhere brings the greatest events from causes apparently the least.

Satellites.	Periodical times.				Distances from primary in miles.
1	1 d.	18 h.	28 m.	36 s.	266,000
2	3	13	17	54	423,000
3	7	3	59	36	676,000
4	16	18	5	6	1,189,000

Of Saturn.

Beyond Jupiter in the solar system is Saturn, formerly considered the most remote of the planets. He shines with a dull, pale, leaden light.

The character of Saturn, ♄, is a scythe, rudely represented; according to some, an old man leaning on a staff. In heathen mythology, Saturn was the father of Jupiter.

Belts and dark spots have been discovered on the disk of Saturn. Five belts, nearly parallel to the equator, were discovered by Huygens. Several nearly parallel to the ring, and more extensive in proportion to the body of the planet than those of Jupiter, were seen by Dr. Herschel. By the spots of Saturn changing their position, his diurnal rotation was determined by Dr. Herschel to be 10 h. 16 m. 0.44 s. Guy, in his "Astronomy," informs us, "later accounts say, 12 h. 13¼ m."

To an inhabitant of Saturn, the Sun's light and heat must be about ninety times less than they are to us.

Viewed with a good telescope, Saturn appears of a spheroidical figure. A remarkable circumstance is, the flattening at the poles does not seem to commence till the high latitude of 43° 20′. According to Dr. Herschel, the proportion of his disk is:

Diameter of the greatest curvature, ...	36
Equatorial diameter, ...	35
Polar diameter, ...	32

The most remarkable phenomenon of Saturn is a ring with which he is encompassed. Something extraordinary in the appearance of this planet was discovered by Galileo. It seemed a large globe between two smaller globes. This discovery he announced in 1610. Continuing his observations till the year 1612, to his surprise the smaller globes disappeared, and the larger remained apparently alone. But after some time the smaller globes again appeared on each side of the larger globe, changing their form as he continued his observations; appearing at different times round, semicircular, oblong like an acorn, with horns toward the globe, becoming gradually so long and wide as to encompass it with an elliptical ring. "Upon this Huygens set about improving the art of grinding object-glasses, and made telescopes which magnified two or three times more than any which had been before made, with which he discovered very clearly the ring of Saturn; and having observed it for some time, he published the discovery in 1656."

The ring of Saturn is double, or rather consists of two concentric rings, detached from each other, and from the body of the planet. The two parts of the ring lie in the same plane, performing a revolution round an axis perpendicular to that plane, in 10 h. 32 m. 15 s. It is visible to us when the Sun is on the same side of its plane with the Earth, but at no other times. A deep shadow is cast by the ring on that part of Saturn which is opposite to the Sun. In this dark shadow, each half of the planet in succession must be enveloped for almost fifteen of our years, or during one half of Saturn's annual revolution. During the same term, each in succession must be illuminated by the double ring, the light of which is more brilliant than that of the planet itself.

The ring of Saturn is considered by Dr. Herschel not as a shining matter, or aurora borealis, as supposed by some, but solid and dense as the body of the planet.

DIMENSIONS OF THE RING.

	Miles.
Inner diameter of the interior ring, .	146,345
Exterior diameter, ...	184,393
Inner diameter of the external ring, .	190,248
Exterior diameter, ...	204,883
Breadth of the inner ring, ...	19,024
Breadth of the external ring, . . .	7,317
Breadth of the vacant space, . . .	2,927

ELEMENTS OF SATURN.

Mean diameter, 79,042 miles.
Mean diameter, as seen from the Sun, 18″.
Inclination of his orbit to the ecliptic, 2° 29′ 34.8″.
Tropical revolution, 29 y. 162 d. 11 h. 30 m. 0 s.
Diurnal rotation, 10 h. 16 m.
Mean distance from the Sun, 900,000,000 miles.
Eccentricity, 50,958,399 miles.

SATELLITES OF SATURN.

Saturn has seven satellites, revolving about their primary, and accompanying him in his revolution round the Sun.

Satellites.	Periodical times.				Distances from primary in miles.
1	0 d.	22 h.	37 m.	22 s.	107,000
2	1	8	53	8	135,000
3	1	21	18	27	170,000
4	2	17	41	22	217,000
5	4	12	25	12	303,000
6	15	22	41	13	704,000
7	79	7	48		2,050,000

The seventh satellite of Saturn is, by some, reckoned the fifth. This satellite is remarkably bright at its greatest western elongation, surpassing all the others but one in luster. Very small at other times, it entirely disappears at its greatest eastern elongation. This phenomenon was first observed by Cassini. It may arise from one part of the satellite being more luminous than the other parts. It was observed through all the variations of light by Dr. Herschel. He concluded that, like the satellites of Jupiter and our Moon, it revolved on its axis at the same time that it performed a revolution round its primary.

"There is not, perhaps," says Dr. Herschel, "another object in the heavens that presents us with such a variety of extraordinary phenomena as the planet Saturn; a magnificent globe, encompassed by a stupendous double ring; attended by seven satellites; ornamented with equatorial belts; compressed at the poles; turning upon its axis; mutually eclipsing its ring and satellites, and eclipsed by them; the most distant of the rings also turning upon its axis, and the same taking place with the farthest of the satellites; all the parts of the system of Saturn occasionally reflecting light to each other; the rings and the moons illuminating the night of the Saturnian; the globe and the satellites enlightening the dark parts of the rings; and the planet and the rings throwing back the Sun's beams upon the moons, when they are deprived of them at the time of their conjunctions."

OF HERSCHEL.

Herschel, Uranus, or Georgium Sidus, was unknown as a planet to the scientific world till the year 1781. On the 13th of March, in that year, it was discovered by the celebrated astronomer whose name it usually bears in this country. Before the discovery, it had probably been seen by astronomers, but had attracted no particular attention. Prior, in his Lectures, tells us, "it had been observed by Flamstead and Mayer, but was considered by them as a fixed star, and, as such, introduced into their catalogues." Viewing the small stars near the feet of Gemini, Dr. Herschel was struck with the appearance of one, less brilliant than the rest, but surpassing them in magnitude. He suspected it to be a comet. Observing it with different telescopes, he found that, contrary to the fixed stars, its disk appeared to increase with the magnifying power of the glasses. He found also, by measuring its distance from some of the fixed stars, at different times, that it moved about $2\frac{1}{4}''$ in an hour. That it was a planet, first occurred to Dr. Maskelyne.

The name of *Georgium Sidus*, or Georgian Star, was given to this planet by Dr. Herschel, in compliment to his patron George III., the then reigning king of Great Britain. It is often called *Uranus*, in European publications. Uranus, in heathen mythology, was the father of Saturn.

This planet is so distant, it is scarcely visible to the naked eye. In a serene sky, however, it appears like a star of the sixth magnitude, shining with a bluish-white light, and a brilliancy between the splendor of the Moon and that of Venus.

Such is the immense distance of this planet that no observations have been made upon it by which the time of its diurnal revolution can be determined.

Herschel is denoted by this character, ♅, the initial of a name immortal as human science; "the horizontal bar being crossed by a perpendicular line, forming a kind of cross, the emblem of Christianity, denoting, perhaps, its discovery was made in the Christian era." The ball, however, represented as pendent from the H, may be a globe or planet, as hanging on the discovery of the astronomer Herschel.

ELEMENTS OF HERSCHEL.

Mean diameter, 35,112 miles.
Mean diameter as seen from the Sun, 4″.
Inclination of his orbit, 0° 46′ 26″.
Tropical revolution, 83 y. 305 d. 7 h. 21 m.
Mean distance of the planet from the Sun, 1,800,000,000 miles.

SATELLITES OF HERSCHEL.

Six satellites have been discovered accompanying Herschel in his dark and tedious round. "It is remarkable," says Prior, "that these satellites revolve in a retrograde direction, or contrary to the order of the signs, in orbits lying nearly in the same plane, and almost perpendicular to the plane of the planet's orbit." This statement is corroborated by other accounts. The satellites of Herschel were all discovered by Dr. Herschel.

Satellites.	Periodical times.				Distances from primary in miles.
1	5 d.	21 h.	25 m.	20 s.	230,335
2	8	16	57	47	298,838
3	10	23	2	47	348,388
4	13	10	56	29	399,593
5	38	1	48	0	746,240
6	107	16	39	56	1,597,708

Causes of the Planetary Motion.

Matter is in itself inactive, and moves but as impelled by external force. An impulse being given to a body, it passes in a right line, till turned out of its course by a different impulse, not in direct coincidence or opposition to the former. Uninterrupted, it would forever move in the same direction, and at the same rate, or over equal distances in equal times. After every new impulse, it will take a new direction, and pass in a diagonal between its former course and the direction of the new impulse.

Comets.

The term *comet* is derived from the Latin *cometa*. This is a derivative, from *coma*, a head or lock of hair. The original is a Greek primitive, *comee*, hair. Without doubt, comets are so called from the train or tail they exhibit when in the vicinity of the Sun.

Comets are large heavenly bodies, moving round the Sun in various directions, and in orbits very eccentric. They seem to come from some far-distant region, make a short circuit round the Sun, and then retire to their unknown bound. By the unlearned, they are often called *blazing stars*. It is not strange, if, as has been represented, in the days of barbarism and superstition, comets were considered portentous; if they were regarded as the harbingers of war, famine, and pestilence; if they presented to the frighted imaginations of men the convulsions of states, the dethronement of princes, and the fall of empires. Even among the ancients, however, men of science regarded them in a very different light. Such men so far observed the motions of comets as to form ideas of them in some measure consonant to modern philosophy. By the Chaldeans, they were considered as planets; and such they were regarded by the Pythagorean philosophers of Italy.

Astronomers of the present day view comets not only as harmless, but designed by the all-wise Creator for benevolent and important purposes; though most of those purposes must be unknown to us, or deduced by reasoning from analogy.

There is a great diversity in comets. When viewed through a good telescope, a comet generally resembles a mass of aqueous vapor surrounding a dark nucleus. The shades of appearance are very different in different comets. Even the nucleus seems wanting in some. Comets of this kind were observed by Dr. Herschel; some by the sister of that astronomer. Approaching the Sun, the nebulous light of a comet becomes more brilliant, and its luminous train increases in length. At the perihelion its heat is greatest, and the length of its train the most extensive. Here the comet sometimes shines with all the splendor of Venus. Its brilliancy decreases as it retires from the perihelion, till it reassumes its nebulous appearance. "History records," says Dr. Rees, "that some comets have appeared as large as the Sun." One of this magnitude is said to have been visible at Rome in the reign of Nero. "The astronomer Hevelius also observed a comet, in 1652, which did not appear to be less than the Moon, though it was deficient in splendor, having a pale, dim light, and exhibiting a dismal aspect." — *Wilkins's Astronomy.*

The number of comets which have been seen within the limits of the solar system is not known. It has been stated at from three hundred and fifty to five hundred.

Some comets have approached nearer to the Sun than any of the planets. Of ninety-eight, whose elements have been computed, twenty-four passed between the Sun and the orbit of Mercury; thirty-three between the orbits of Mercury and Venus; twenty-one between the orbits of Venus and the Earth; sixteen between the orbits of the Earth and Mars; three between the orbits of Mars and Ceres; and one between the orbits of Ceres and Jupiter.

The tails of comets sometimes occupy an immense space. The comet of 1681 stretched its tail across 104°; that of 1769 subtended an angle of 60° at Paris, 70° at Boulogne, 97° at the Isle of Bourbon.

By some, the tails of comets have been considered the rays of the Sun, transmitted through the nucleus of the comet, believed to be transparent like a lens. This was the opinion of Appian, Cardan, and Tycho Brahe. Kepler thought the tail was formed by the solar rays driving away the denser parts of the comet's atmosphere. Euler thinks there is a great affinity between the aurora borealis, the zodiacal light, and these tails; and that the cause of them all is the action of the Sun's light on the atmosphere of the Earth, the Sun, and the comets.

The hypothesis of Dr. Hamilton, of Dublin, deserves particular consideration. He supposes the tails of comets to be streams of electrical light. The doctor supports his opinion by these arguments: "A spectator at a distance from the Earth would see the aurora borealis in the form of a tail, opposite to the Sun, as the tail of a comet lies. The aurora borealis has no effect upon the stars seen through it, nor has the tail of a comet. The atmosphere is known to abound with electric matter; and the appearance of the electric matter in vacuo resembles exactly that of the aurora borealis, which, from its great altitude, may be considered in as perfect a vacuum as we can make. The electric matter in vacuo suffers the rays of light to pass through without being affected by them. The tail of a comet does not expand itself sideways, nor does the electric matter. Hence he supposes the tails of comets, the aurora borealis, and the electric fluid to be the same kind of matter." It may be added, in confirmation of this hypothesis, that many astronomers have observed an undulatory motion in the tails of comets similar to what is sometimes seen in the aurora borealis. About the close of the Revolutionary war the aurora borealis was most extensive and brilliant in the United States. This, with vast undulations, covered the whole northern half of the hemisphere, collecting into a beautiful center in the zenith. To a spectator on a distant planet this might give the Earth an appearance resembling, in some measure, the blazing effulgence of a comet.

Equation of Time.

Though the apparent motion of the Sun has been used as a measure of time from the greatest antiquity, yet accurate observation has shown it is far from being uniform. The Sun is either faster or slower than a well-regulated clock or watch during most of the year. At four times only do they coincide, viz.: the 14th of April, the 15th of June, the 31st of August, and the 23d of December. From the 14th of April to the 15th of June, the Sun is fast of clock; from the 15th of June to the 31st of August, it is slow of clock; from the 31st of August to the 23d of December, it is fast of clock; from this time to the 14th of April, it is slow of clock. From the difference of longitude, the days of coincidence are not all the same in the United States as in Europe. About the 1st of November the Sun is 16 m. 14 or 15 s. fast of clock. This is the greatest inequality. The difference is caused by the elliptical figure of the Earth's orbit, and the obliquity of the equator to the plane of the ecliptic.

The Tides.

The tides are the alternate ebbing and flowing of the Sea. They are imperceptible in the midst of the ocean, and can only be known by the rising of the water on the adjacent land, or where the depth of water will admit of sounding.

Kepler was the first who discovered the true cause of the tides, and that the attraction of the Sun and Moon produced the constant flux and reflux of the water. But a "hint being given, the immortal Sir Isaac Newton improved it, and wrote so amply on the subject as to make the theory of the tides in a manner quite his own, by discovering the cause of their rising on the side of the Earth opposite to the Moon. For Kepler believed that the presence of the Moon occasioned an impulse, which caused another in her absence."

The attraction of the Moon is the principal cause of the tides; but the attraction of the Sun operates to increase or diminish the height or depression of the water occasioned by the lunar attraction. But were every part of the Earth equally attracted by the heavenly bodies, no tide could be produced. The unequal attraction, or the attraction of one part of the terraqueous globe more forcibly than the other, may be considered as the true cause of the tides. The force of attraction in any body decreases as the squares of the distances from that body increase. Hence the farther distant any body is from the center of attraction, the less the operation on that body. The water, therefore, on the side of the Earth next to the Moon is more forcibly attracted than the body of the Earth, and the body of the Earth than the water on the opposite side. Suppose three particles of matter, one on the surface of the Earth next to the Moon, one at the center of the Earth, and one on the surface opposite to the Moon. By the laws of gravitation the particle nearest to the Moon would be more attracted by her than that at the center, and that at the center more attracted than the particle on the opposite side. By the unequal attractions the distances between these particles would be increased. One would be elevated from the center, and the center particle would be drawn from that on the side opposite to the Moon, amounting to the same thing as if the opposite particle were elevated. For, when the distance between the center of the Earth and a particle at the surface is increased, the particle will appear raised from the surface. We take notice of a tide, because the water rises on the adjacent land. This will be the case when the distance between the surface of the water and the center of the Earth is increased, whether the water be elevated from the Earth, or the Earth be withdrawn from the water. No more difficulty, therefore, arises in accounting for the tide on the side of the Earth opposite the Moon than for that on the surface nearest to her, both being the effect of unequal attraction.

The points directly under and opposite to the Moon may be considered as the centers of highest elevation; and 90° from these, or half the distance between them, as the circle of low water. This extends wholly round the Earth, and moves as the Moon moves.

When the Moon is in the equator the circle of low water, 90° distant, must extend from pole to pole. Every place from the equator to the poles must have its regular return of tides; and these, uninfluenced by extraneous causes, must return at equal intervals.

As the Moon moves from the equator toward either tropic, the circle of low water recedes from the poles toward the polar circles, arriving at these when she arrives at the tropics.

This departure of the Moon from the equator must make flood tide at the poles, increasing as her declination increases, and highest when she is farthest distant from the equator. On her return the tides ebb at the poles, where it becomes low water when she arrives at the equinoctial. In a revolution of the Moon, therefore, two tides only occur at the poles, full sea returning at intervals of about 13⅔ days. During the interval in which the circle of low water is distant from the poles, places in any parallel touching the highest point of that circle have but one tide in a revolution from the Moon round to the Moon again. Places between that circle and the poles, in the same time, have but one, and that a partial tide; while all below its highest point have two tides in succession.

At the equator the intervals between high and low water, or between a tide and a succeeding tide, remain equal, whatever may be the declination of the Moon. When she is in the equator the tides return at equal intervals in all latitudes. But when she is in any degree of declination, places on each side of the equator, cutting the circle of low water in their diurnal rotation, or which are below the highest point of ebb tide, have unequal duration of ebb and flood, or of time between high and low water in different parts of the lunar day; the farther distant from the equator, the more unequal the returns.

The Moon being in her north declination, places in the northern hemisphere have their highest tides, but when she is in the south declination the opposite tides are the highest. In the southern hemisphere the whole is reversed.

The tide, as raised by the Moon, is greater on the side of the Earth next to her than that on the opposite side. The cause of this is apparent. For, as she is nearer to that side, the semi-diameter of the Earth bears the greater proportion to the shorter distance.

For convenience of explication, the highest tides have been considered directly under and opposite the Moon. It is, however, learned from observation that the tide is not at its greatest height above or below the horizon till after the Moon has passed the meridian; because the water having obtained a direction, continues that direction after the Moon has passed till prevented by external force. Similar occurrences are common. The heat of the day is most intense after the Sun has passed the meridian; and the extreme of summer heat is generally not till some time after the summer solstice.

The tides are in some measure altered by the inclination of the Moon's orbit to the plane of the ecliptic. Hence the highest elevation of water may at times be more than 5° above the tropics; and the region of single tide reduced as much below the polar circles.

The tides, as we have seen, are affected by the influence of the Sun. The attraction of the Sun is more powerful at the Earth than that of the Moon, but has less effect in raising tides. The immense distance of the Sun from the Earth causes his attraction on the different parts to be nearly equal, the semi-diameter of the Earth bearing but a very small proportion to this immense distance. The influence of the Sun causes the tides to be earlier in the first and third quarters of the Moon; later in her second and fourth. In the former case the tide of the Moon is preceded by that of the Sun; in the latter, it is succeeded and retarded by the elevation of water raised by the Sun. The highest tides are denominated *spring tides*. These happen at the conjunctions and oppositions of the Sun and Moon, or at the changes and fulls.

ECLIPSES.

An *eclipse* is a partial or total obscuration of a heavenly body.

So far as astronomical observation has extended, the Sun is the only heavenly luminary in the solar system that shines by its own light. The planets are in themselves opaque, and shine only by reflecting the solar rays. Hence on the side of those not illuminated by the Sun dark shadows are cast. These shadows are in the form of vast cones extending into the heavens. They are but privations of light in the space hid from the Sun. That they are not coextensive with the Sun's light, but terminate at a distance far more limited is evident, because the primary planets never eclipse each other. Mars, though often in opposition to the Sun, is never eclipsed by the Earth's shadow. This must, therefore, terminate before it reaches that planet.

The shadow of the Earth when longest is about 219 of its semi-diameters. Different computations make a trifling difference in the mean extent of this shadow. If the diameters of the Earth and Sun be taken as before stated, and the shadow be computed from these, it will be found to be about 217 semi-diameters of the Earth, equal to 864,094 miles.

If the Moon revolved in the plane of the ecliptic, an eclipse would happen at every conjunction and opposition, or at every change and full. But her orbit being inclined to that circle in an angle of 5° 9′ 3″, varying a little at different times, eclipses cannot happen except when she is in or about her nodes. In every other part of her orbit she is either too far north or south to eclipse the Sun, or to fall into the Earth's shadow, and be herself eclipsed. The limit is different in different species of eclipses. For if the Moon be within about 17° of either of her nodes at the change there will be a solar eclipse. But lunar eclipses can happen but when she is within about 11° of her nodes. The greatest limit in solar eclipses, according to the tables in the author's larger work, is 18° 11′; the least, 16° 28′. The greatest in lunar, 11° 51′; the least, 10° 11′.

In lunar eclipses, when a part only of the Moon's disk is covered, the eclipse is denominated *partial;* when the whole disk is covered, *total;* when the center of the disk passes through the center of the shadow, *central*.

The Moon is visible when totally immersed in the Earth's shadow, appearing of a dusky red color, like burnished copper. It is probable that the refracted rays of the Sun cause this phenomenon. These traversing the atmosphere of the Earth are by it turned inward, so as to fall on the Moon, and render her distinctly to be seen.

In a lunar eclipse, all to whom the Moon is visible see her in the same instant of absolute time.

Solar eclipses are much more frequent than lunar; but most of the former are invisible at any particular part of the Earth.

The dark shadow of the Moon sometimes reaches to the Earth, eclipsing a small portion of its surface; sometimes that dark shadow is terminated before it arrives at the Earth. In the latter case, the Sun, at the center of an eclipse, appears like a luminous ring. The eclipse is then called *annular*. This beautiful phenomenon was seen in some parts of New England on the morning of April 3, 1791; at Washington, September 17, 1811; and in the Eastern parts of the United States, February 12th of the year 1831. The dark shadow of the Moon is longest when she is in perigee and the Earth in aphelion; shortest when she is in apogee, and the Earth in perihelion. The inhabitants of our republic have had the satisfaction of viewing three annular eclipses since the commencement of the present century; one, September 17, 1811, another, February 12, 1831, and another, September 18, 1838; the annular eclipses being three for the century.

Two total solar eclipses are computed for the United States during the century; one June 16, 1806; the other, August 7, 1869. It will appear from this, and from inspection of the tables of the semi-diameters of the Sun and Moon, that annular eclipses of the Sun are more frequent than total eclipses of the same luminary.

The Moon's partial shadow is called her *penumbra*. All the inhabitants over whom this shadow extends see the Sun partially eclipsed. The darkness of the penumbra decreases as it diverges from the dark shadow of the Moon. The motion of the dark shadow and penumbra over the Earth is nearly from west to east; except at the polar regions, when they sometimes pass in an opposite direction.

The whole number of eclipses in any one year is never less than two, nor more than seven: when two, both are of the Sun; when seven, four are of the Sun, three of the Moon.

The line of the Moon's nodes has a constant motion from east to west, or backward in the ecliptic, making a complete revolution in 18 y. 223 d. 20 h. 13 m. 32 s. In a year of 365 days its motion is 19° 19′ 43″, completing a revolution in 18 y. 224 d. 4 h. 53 m. when leap-year is four times taken; in 18 y. 223 d. 4 h. 53 m. when leap-year is five times included. By the retrograde motion of the nodes, either of them is brought round to the Sun, or passes from the Sun to the Sun again, in 346 d. 14 h. 52 m. 14 s. on a mean. Half of this time only intervenes between one node and the other passing the Sun. When eclipses happen at the ascending node, other eclipses may be expected at the descending node in about 173 d.; and, after a lapse of the same time, at the ascending node, thus continuing in rotation.

When the Sun and Moon have been in conjunction with the Moon's ascending or descending node, they will be in conjunction again within 28′ 12″ of the same node, after 223 mean lunations. Thus is formed a regular period of eclipses. It is completed in 18 y. 11 d. 7 h. 43 m. 19 s. when leap-year is four times included; 18 y. 10 d. 7 h. 43 m. 19 s. when leap year is five times included. There is a regular series of returns to each eclipse. Eclipses at the ascending node first strike the Earth at the north, and pass off at the south pole, moving a little southward at each return. Eclipses at the descending node commence at the south and retire at the north pole. After an eclipse has completed a series, and left the Earth, it will not again return and commence a new series at the same node, till after an absence of more than 12,000 years. The eclipses commencing at one pole are equal in number to those commencing at the other. The irregular motion of the Earth and Moon may accelerate or retard the commencement of a series about one hundred years. In one series an eclipse may visit the Earth but seventy times; it will not surpass seventy-seven times. When an eclipse returns but seventy times, it will occupy about 1,262 years; when it returns seventy-seven times, it will require 1,388 years. The memorable eclipse of June 16, 1806, was total to a large part of New England. It happened at the Moon's descending node. Having traversed the mighty void from the creation, it first met the south pole on the morning of the 6th of March, O. S. 1049, at 10 h. 11 m. 39 s. Each visit has shown it a little farther north. On the 24th of June, 1824, it happened in the evening, the Sun going down a little eclipsed at Washington. It again visited the Earth, July

8, 1842. But, being at 2 h. 2 m. 2 s. in the morning, at Washington, it was invisible in the United States; but was large and total over a wide extent of the eastern continent. This eclipse will leave the Earth at the north pole on the 11th of May, in the year 2347, N. S. of the Christian era.

The dark shadow of the Moon, when longest, and falling directly on the Earth, extends about 107 miles. In most cases, however, it falls obliquely; in some, very obliquely, when it may cover an extent of more than 900 miles.

The tables make the extent of the penumbra, when least, about 4,500 miles; when greatest, a little more than 7,000 miles. It is very different at different times, varying on account of the distance of the Sun and Moon, but more from the oblique manner in which it often strikes the Earth.

According to the tables in the author's larger work, total darkness in a solar eclipse will never continue in one place more than 5 m. 32 s. The duration will be a little longer, according to the tables of Enfield. Several authors state this duration short of the truth, making it three minutes, or about three minutes. In the June eclipse of 1806, total darkness was considerably short of the greatest possible duration; yet, in the southern part of New Hampshire, the author, by the most careful observation, made it 4 m. 20 s. At Sterling, Massachusetts, Robert B. Thomas, the author of the Farmer's Almanac, probably nearer the center of the shadow as it passed, found the time of total darkness 4 m. 45 s.

ECLIPSES VISIBLE IN THE UNITED STATES.

Year.	Species.	Month.	D.	H.	M.	A. P. M.	Remarks.
1859	◐	Feb.	17	5	36	A. M.	Total.
	☉	July	29	5	44	P. M.	Small.
1860	◐	Feb.	6	9	17	P. M.	
	☉	July	18	7	55	A. M.	
1861	◐	Dec.	17	3	9	A. M.	
	☉	Dec.	31	7	45	A. M.	
1862	◐	June	12	1	18	A. M.	Total.
	◐	Dec.	6	2	43	A. M.	Total.
1863	◐	June	1	6	30	P. M.	Total. Moon rises eclipsed.
	◐	Nov.	25	4	21	A. M.	
1864							
1865	◐	April	10	11	29	P. M.	Very small.
	◐	Oct.	4	5	50	P. M.	Very small.
	☉	Oct.	19	10	27	A. M.	
1866	◐	March	30	11	30	P. M.	Total.
1867	◐	March	20	3	45	A. M.	
	◐	Sept.	13	7	30	P. M.	

Year.	Species.	Month.	D.	H.	M.	A. P. M.	Remarks.
1868							
1869	◑	Jan.	27	8	21	P. M.	
	☉	Aug.	7	6	5	P. M.	Total over a southern section of the [Union.
1870							
1871	◑	Jan.	6	4	9	P. M.	Moon rises partially eclipsed.
1872	◑	Nov.	15	0	29	A. M.	Very small.
1873	◑	May	12	6	23	A. M.	Commences 4h. 34m. Total in the [Western States.
1874	◑	Oct.	25	2	37	A. M.	Nearly total.
1875	☉	Sept.	29	6	12	A. M.	
1876	◑	March	10	1	5	A. M.	
	☉	March	25	4	45	P. M.	Small.
1877	◑	Aug.	23	6	2	P. M.	Total. Moon rises eclipsed.
1878	◑	Feb.	17	5	58	A. M.	
	☉	July	29	5	35	P. M.	
	◑	Aug.	12	7	3	P. M.	
1879							
1880	☉	Dec.	31	7	42	A. M.	
1881	◑	June	12	1	56	A. M.	Total.
1882							
1883	◑	Oct.	16	2	8	A. M.	
1884	◑	April	10	6	47	A. M.	Total in the western parts of the [Union.
	◑	Oct.	4	5	14	P. M.	Visible, and total after the Sun sets.
1885	☉	March	16	1	28	P. M.	
	◑	Sept.	24	2	56	A. M.	
1886	☉	March	5			P. M.	Commences about sunset. Visible [in the Western States.
	☉	Aug.	29	6	23	A. M.	Very small.
1887	◑	Feb.	8	5	4	A. M.	
1888	◑	Jan.	28	6	6	P. M.	Total.
	◑	July	23	0	35	A. M.	Total.
1889	☉	Jan.	1			P. M.	Penumbra touches Washington about [sunset.
	◑	Jan.	17	0	18	A. M.	
1890							
1891	◑	Nov.	15	7	36	P. M.	
1892	◑	May	11	6	0	P. M.	Visible after sunset.
	☉	Oct.	20	1	40	P. M.	
1893							
1894	◑	Sept.	14	11	24	P. M.	
1895	◑	March	10	10	28	P. M.	Total.
	◑	Sept.	4	0	49	A. M.	Total.
1896	◑	Aug.	23	1	55	A. M.	
1897	☉	July	29	9	45	A. M.	
1898	◑	Jan.	7	7	16	P. M.	Small.
	◑	Dec.	27	6	37	P. M.	Total.
1899	◑	Dec.	16	8	34	P. M.	
1900	☉	May	28	8	40	A. M.	

Divisions of Time.

Time, as measured by the celestial luminaries, is divided into periods, cycles, years, months, weeks, days, hours, minutes, seconds, and sometimes farther sexagesimal parts.

Periods, in astronomical reckoning, are large divisions of time. The *Chaldean Period* is a circle of 25,858 years. This period respects the motion of the terrestrial poles. At the termination of it, the axis of the Earth points to the same stars as at the beginning.

The *Julian Period* is formed by multiplying together the cycles 28, 19, and 15. It consists of 7,980 years. The creation of the world, according to the common computation, was on the 706th year, and the Dionysian era of Christ's birth, on the 4,713th year, of this period. According to some, the birth of Christ was earlier by four years. The Julian period is found of use in comparing the dates of ancient events.

The *Dionysian Period*, or circle of Easter, consists of 532 years, formed by multiplying the cycle of the Sun, 28, by that of the Moon, 19.

CYCLES ARE REVOLUTIONS OF TIME.

The *Cycle of the Sun* consists of 28 years. By this cycle the days of the week are brought to the same days of the month; the Sun to the same signs and degrees of the ecliptic, with little variation; and the leap-years to the same state as at the commencement of the cycle. Each of these returns, separately, in a much shorter period. But, by the cycle, they are brought to coincide.

The *Cycle of the Moon* is the *Golden Number*. It is a period of 19 years, at the expiration of which, the changes and fulls, with the other aspects of the Moon, return to the same months, and days of the month, as at the beginning, or within a day of the same time.

The *Roman Indiction* is a period of fifteen years, established by Constantine, in the year 312, for indicating the times of certain payments, made by the subjects to the government.

For finding the cycle of the Sun, golden number, and indiction, add 4,713 to the year of the Christian era, and divide the sum by 28, 19, and 15, respectively; the remainders are the numbers sought for the year.

Required the cycle of the Sun, golden number, and indiction, for the year 1831.

4713	28)6544(233	19)6544(344	15)6544(436
1831	56	57	60
6544	94	84	54
	84	76	45
	104	84	94
	84	76	90
	20 Cycle of Sun.	8 Golden number.	4 Indiction.

The *Epact* is the excess of the solar above the lunar year of 354 days, or 12 mean lunations. It is taken for the age of the Moon, on the first day of January.

For finding the Julian epact, multiply the golden number of the year by

11; the product, if less than 30, is the epact. But, if the product exceed 30, divide it by 30; the remainder is the epact.

To find the Gregorian epact, the Julian epact must be first found. From this subtract 12, the number of days between the old and new style in the present century; the remainder is the epact required. If nothing remain, 29 is the epact. If the subtraction cannot be made, add 30 to the Julian epact, and subtract as before.

The golden number and epact are little used at the present time, especially where accuracy is required. The Roman indiction, still less important, is retained in our almanacs; why, is difficult to be conceived, unless as it is used in forming the Julian period.

A YEAR.

A complete revolution of the seasons constitutes a *year*. The difference in the years, the tropical, the sidereal, and anomalistic, has been considered. The civil solar year consists of 365 days, and in bissextile, of 366. In this manner it is used in the United States, and most European nations. The lunar year consists of 12 lunar months, or mean lunations; computed at 354 days, the surplus arising from the minutes and seconds of the lunation being generally dropped in the computation. In this calendar a month is added every third year, to make the lunar coincide with the solar year. This month is intercalary, or *embolimic*.

The Jews computed their time by lunar years. "But, by intercalating no more than a month of thirty days, which they called *Ve-Ader*, every third year, they fell $3\frac{3}{4}$ days short of the solar year in that time."

The year of the Greeks consisted of 12 months, of 29 and 30 days, alternately taken, comprising 354 days, or about 12 mean lunations. This lunar year was with difficulty connected with the solar year, or the revolution of the seasons, so as to make a particular month fall at the same season in successive years. "The Olympic games were celebrated every fourth year during the full Moon, next after the summer solstice; and the year of the Greeks was so regulated as to make this full Moon the first month. This purpose was effected by intercalations; but these were managed so injudiciously, that, in the time of Meton, the calendar and the celebration of the festivals had fallen into great confusion."

The ancient Romans computed their time by the *Lustrum*, a period of four years. They also reckoned by lunar years, as established by Romulus, till Julius Cæsar reformed the calendar, introducing the system of computation known as the *Julian calendar* to the present time. In this calendar three years were common, consisting of 365 days each. Every fourth year the 24th day of February was twice reckoned, making it consist of 366 days. This, being the 6th of the calends of March, was called *bis sextus dies*, denominated by us *bissextile*. The intercalary day is now added to the last of February, and from it the year is called *bissextile*, or *leap-year*. The Julian calendar long prevailed in Europe. But, from observations on the time of Easter, the civil year was found to be too long for the tropical, and another attempt was made to reform the calendar.

The vernal equinox fell on the 21st of March, at the time of the Council of Nice, 325 of the Christian era. In 1582 Pope Gregory XIII. observed, that the same equinox happened ten days earlier in the year than it had done at the time of the Nicene Council. To correct the style, he altered the calendar ten days, ordering that the 5th day of October should be called the 15th. Thus amended, the style was called the *Gregorian*, or *new style.* Though adopted in several European countries, it was not received into England till the year 1752. The Julian calendar, or old style, still prevails in Russia. In the present century, the difference between the old style and the new is twelve days, as before stated.

Pope Gregory stopped not at the alteration of the style. He endeavored to establish a principle by which the civil year and the tropical would in future coincide. By this principle bissextile is to be omitted three times in four hundred years. When the centuries of the Christian era are divided by four, if there be a remainder, the year at the end of the century is to be reckoned common; but if nothing remain, the leap-year is to be retained, or the last year of the century is to be reckoned bissextile. Though the year 1800 would have been a leap year in the Julian calendar, yet it was considered common in all our almanacs on the Gregorian principle. Our computations to the present time are made on he same principle. Thus, at the end of the nineteenth century, the leap-year is to be omitted, there being a remainder when nineteen is divided by four; but the year 2000 will be considered bissextile, because there is no remainder when twenty is divided by four.

The omission of three bissextiles in four hundred years does not bring the civil year exactly to coincide with the tropical, as computed by La Place. The former still exceeds the latter twenty seconds, twenty-four thirds. This excess will amount to a day in about 4,236 years. The omission of one bissextile in one hundred and twenty-nine years would bring the different computations to great nearness.

Months are the principal divisions of a year. These are lunar, solar, and civil. The sidereal lunar month is the time the Moon is passing from a point in the heavens to the same again, as from a star to the same star, as before stated. But the principal lunar month is a lunation, or the time the Moon is passing from one change to another. This seems to have given the name to this division of time, or to be the foundation of *months.* The solar month is the time the Sun is passing one of the signs of the ecliptic, or the twelfth part of a year.

Civil months are of two kinds. The weekly month, always equally long, consists of four weeks. This is the true legal month. "A month in law," says Blackstone, "is a lunar month, or twenty-eight days, unless otherwise expressed; not only because it is one uniform period, but because it falls naturally into a quarterly division by weeks. Therefore a lease for *twelve months* is only for forty-eight weeks; but if it be for *a twelvemonth*, in the singular number, it is good for the whole year."

The other months are those in our calendar. They are Roman in their origin. The Latin names are retained, some of them assuming an English termination. The sixth month was called *Sextilis* till the time of Augustus Cæsar. It was changed to *Augustus*, in honor of that emperor. To heighten the compliment, a day was taken from the last of February, and added to August. Before that time February, in a common year, consisted of twenty-nine days, August of thirty.*

---

* The number of days in each month may be remembered by the following lines:

"Thirty days hath September,
April, June, and November;
All the rest have thirty-one,
Saving February alone."

A *week*, a well-known portion of time, and old as creation, undoubtedly had its origin in the resting of Jehovah from his work, and the establishment of the Sabbath. It consists of seven days.

Days are *artificial* or *natural*. The *artificial day* is continually varying in length in most latitudes, being the time the Sun is above the horizon. The *natural day* is the time in which any meridian of the Earth moves from the Sun round to the Sun again, being twenty-four hours. This is subject to a fractional variation at different seasons. The ancient Egyptians began their day at midnight. This is the practice of the United States, and of most European nations. It is the civil day with us, and is divided into two twelves. From common practice, it is too well-known to need explanation. The Jews began their days at the setting of the Sun. They divided the night and the day each into twelve equal parts. As this was done at all seasons of the year, not only the days but the hours, or divisional parts, must have been of unequal length; though not so unequal as such a division would be with us, Palestine being nearer the equator than most of the United States. The ancient Greeks also began their day at Sun-setting. The same practice is followed among the moderns, by the Bohemians, the Silesians, the Italians, and Chinese. The day was commenced at Sun-rising by the Babylonians, Persians, and Syrians. This is the manner of computation by the modern Greeks.

The nautical or sea day commences at noon, twelve hours before the civil day. The first twelve hours are marked P. M., the last A. M. The astronomical day begins at noon, twelve hours after the civil day, and is reckoned numerically from one to twenty-four.

An hour is the twenty-fourth part of a natural day. This division of time is very ancient. Herodotus observes, "that the Greeks learned from the Egyptians, among other things, the method of dividing the day into twelve parts. The division of the day into twenty-four hours was not known to the Romans before the Punic war. Till that time they only regulated their days by the rising and setting of the Sun." The day was divided by them into four watches, commencing at six, nine, twelve, and three of the clock. The night was divided in the same manner into four watches, each consisting of three hours.

The remaining divisions of time all proceed in the well-known sexagesimal order—the hour is divided into sixty minutes; the minute into sixty seconds; the second into sixty thirds; and so on to fourths and fifths.

The *dominical letter* is deserving a place in a work of this kind. The first seven letters of the alphabet were formerly placed in almanacs for the days of the week. Introduced by the primitive Christians, they were used instead of the nundinal letters of the Roman calendar. One of these, standing for the Sabbath, was written in capitals, and called the *dominical* letter, from *Dominus*, the Latin word for *Lord*. The dominical letter is still retained in our almanacs, while figures are substituted for the other letters.

If 365, the days in a common Julian year, be divided by seven, the number of days in a week, one will remain. If there were no remainder, and no bissextile, each succeeding year would begin on the same day of the week. But one remaining, when a common year is thus divided, each year will begin and end on the same day of the week. When January begins on Sunday, *A* is the dominical letter for that year. But the next year must commence on Monday; *A*, therefore, or the substituted figure is set at that day. The Lord's day being the seventh of the month, *G* will be the dominical letter for that year. As the following year must commence on Tuesday, *F* is the dominical letter for that year. Thus the letters would follow, G, F, E, D, C, B, A, in retrograde order. At the end of seven years the days of the week would return to the same days of the month as at the beginning. But bissextile having 366 days, if this be divided by seven, there will be a remainder of two. Thus there must be an interruption of the regular returns.

The letters were placed in such order that *A* stood at the first day of January, *B* at the second, *C* at the third; thus on throughout the seven. The same were repeated in succession through the year. In each succeeding year, therefore, the same letters stood at the same days of the month. This always brought *C* to the 28th of February. That this order might not be interrupted by leap-year, *C* was placed at the 29th also; or, according to some tables, *D* was repeated. Thus the same letters were set to the days of the succeeding months in bissextile, as in common years. If a year commence with *D* as the dominical letter, *C* at the 28th of February must in that case stand for Saturday; *C* also must be against the 29th, and of course being for the Lord's day must be dominical; or, if *D* be repeated, *C* at the 7th of March becomes dominical, and thus continues through the year. The next year would commence two days later in the week. On account of this *leaping* in the retrograde order of the letters, the seven occupy five years in a revolution, when leap-year is twice included; six, when it is once included. Hence the days of the week return to the same days of the month in five or six years, according as bissextile is twice or but once included. In twenty-eight years the seven letters will always have five revolutions, except at the end of the centuries, when leap-year is omitted.

Obliquity.

The obliquity of the equator to the plane of the ecliptic, being the cause of the variety of seasons, the different length of days and nights, and the pleasing vicissitudes resulting from the varying year, is well deserving a place, even in a compendium of astronomy. The principal inquiry is, whether the obliquity remains the same, or is subject to a constant diminution.

"The obliquity of the ecliptic to the equator," says Dr. Brewster, "was long considered a constant quantity. Even so late as the end of the seventeenth century, the difference between the obliquity, as determined by ancient and modern astronomers, was generally attributed to inaccuracy of observation, and a want of knowledge of the parallaxes and refraction of the heavenly bodies. It appears, however, from the most accurate modern observations, at great intervals, that the obliquity of the ecliptic is diminishing. By comparing about one hundred and sixty observations of the ecliptic, made by ancient and modern observers, with the obliquity of 23° 28′ 16″, as observed by Tobias Mayer, in 1756, we have found that the diminution of the obliquity of the ecliptic, during a century, is 51″; a result which accords wonderfully with the best observations." This would bring the obliquity at the present time, 1858, to 23° 27′ 25″.

The above statement, though contrary to the opinion of some philosophers, is in accordance with the true principles of Newtonian philosophy, and is corroborated by the best modern astronomers. Professor Vince, having stated the observations of many authors, ancient and modern, concludes: "It is manifest, from these observations, that the obliquity of the ecliptic continually decreases; and the irregularity, which here appears in the diminution, we may ascribe to the inaccuracy of the observations; as we know that they are subject to greater errors than the irregularity of this variation."

The following table will give an idea of the diminution of the obliquity for many centuries. It was extracted from "Rees's Cyclopædia."*

Obliquity of the Ecliptic, from Observations at different Times.					Mean Obliquity for 40 Centuries.			
	B. C.	°	′	″	B. C.	°	′	″
Pytheas	324	23	49	23	900	23	50	26
Eratosthenes . .	230	23	51	20	400	23	46	30
Hypparchus . .	140	23	51	20	0	23	43	15
	A. D.				A. D.			
Ptolemy	140	23	48	45	100	23	42	26
Arzachel . . .	1104	23	33	30	500	23	39	6
Propatius . . .	1300	23	32		1000	23	34	51
Waltherus . . .	1476	23	30		1500	23	30	33
Tycho Brahe . .	1584	23	31	30	1700	23	28	49
Kepler	1627	23	30	30	1800	23	27	57
Flamstead . . .	1690	23	29		2000	23	26	13
Mayer	1756	23	28	16	2500	23	21	52
Maskelyne . . .	1800	23	27	56·6	3000	23	17	31

The Fixed Stars.

The *fixed stars* are so denominated from their always retaining the same situation in relation to each other. We have seen that the Earth is, at one season of the year, 190,000,000 miles distant from its situation at the opposite season; yet these stars have no sensible parallax. The star which is north at one time is north at any other time. Most of the stars, indeed, appear to have a diurnal revolution round the Earth; but this arises from the rotation of the Earth on its axis, and is no more than is caused by that rotation.

That the stars always retain the same apparent situation, must be owing to their immense and inconceivable distance. Let two persons be placed one rod distant from each other, east and west. An object ten rods distant, which is due north from one, will easily be perceived not to be north of the other. But let the object be ten miles distant from these observers, and if it be north of one it will scarcely be perceived not to be north of the other; the angle can be ascertained only by nice observation. Let this principle be applied to the fixed stars and the student will be sensible that their distance is truly immense. We form very inadequate ideas of the Earth's distance from the Sun; of course of twice that distance. But this immense distance, 190,000,000 miles, makes no perceptible difference in the situation

* A small difference will be seen between the statement of Dr. Rees and that of Professor Vince respecting the obliquity, as observed by some of these authors. But as the general principle is not affected, it may be useless to attempt a reconciliation.

of the fixed stars, even when viewed with the nicest instruments. "From what we know," says Mr. Ferguson, "of the immense distance of the stars, the nearest may be computed at 32,000,000,000,000 of miles from us, which is farther than a cannon-ball would fly in 7,000,000 of years.

From the distance of the stars it may be concluded that they shine by their own native light, and not by the reflected rays of the Sun. For those rays, decreasing in number in any given space as the squares of the distances increase, cannot by reflected light make objects visible at a distance so inconceivably great.

The fixed stars are, without doubt, suns to other systems. Thus they are now considered by the unanimous consent of astronomers. They may be distinguished from the planets by the twinkling of their light. The diameter of a star appears much less viewed through a good telescope, than when seen without the aid of instruments.

Not more than 1,000 stars are visible to the naked eye in either hemisphere. They seem, indeed, innumerable when in a clear evening we turn our eyes toward the heavens. But, in attentive observation, most of those bright spots which appeared to be stars vanish. They are probably reflections from minute particles of various kinds continually floating in our atmosphere. The British catalogue contains not more than about 3,000 stars in both hemispheres, though it includes many not visible to the naked eye. By improved reflecting telescopes the number is found to be great beyond all conception. Dr. Herschel says, "that in the most crowded part of the milky-way, he has had fields of view that contained no less than 588 stars, and these were continued for many minutes, so that in a quarter of an hour he has seen 116,000 stars pass through the field of view of a telescope of only 15′ aperture; and at another time, in 41 minutes he saw 258,000 stars pass through the field of his telescope."

Many stars appear single to the naked eye, which on being viewed with a good telescope, are found to consist of two, three, or more stars. Some are denominated by Dr. Herschel *insulated* stars, because they seem removed from the attractive force of other stars. Such are our Sun, Arcturus, Capella, Sirius, and many others.

"A binary sidereal system, or double star, properly so called, is formed by two stars situated so near each other as to be kept together by their mutual attraction." It is, however, evident that stars may be situated one nearly behind the other, so as to appear binary though immensely distant.

The double star *Epsilon*, Bootes, is beautiful, composed of two stars, one light red, the other a fine blue.

The double star *Zeta*, in the constellation Hercules, is composed of two stars; the greater a beautiful bluish white, the less a fine ash-color.

The star *Delta*, of the Swan, is binary, composed of two stars very unequal in their apparent magnitude; the larger white, the less reddish.

The pole-star is binary, composed of two stars of very unequal magnitude; the larger white, the less red.

The treble star in the left fore-foot of the constellation Monoceros, is one of the most beautiful objects of the kind in the heavens.

The *Beta*, in the constellation Lyra, or the Harp, is quadruple, white, but three of them inclined to red.

The *Lambda*, in Orion, is quadruple. More properly it is a double star with two stars at a small distance. The double star is unequal; the largest white, the smallest a pale rose-color.

A catalogue of the principal double stars may be seen in Dr. Brewster's supplement to Ferguson. Its insertion here would far exceed the limits designed for this compend.

Several stars have appeared for a time in the heavens and then disappeared. In ancient catalogues stars are enumerated which are not now to be seen, even by the powerful instruments of modern astronomy. Others are now visible which seem not to have been noticed by the ancients.

A new star was discovered by Cornelius Gemma, in 1572, in the chair of Cassiopeia. It surpassed Sirius in brightness and magnitude. To some eyes it appeared larger than Jupiter, and might be seen at mid-day. It afterward gradually decreased, and after sixteen months entirely disappeared.

In 1596, the *Stella Mira*, or wonderful star in the neck of the whale, was observed by Fabricius. It seemed alternately to vanish and reappear seven times in six years. During this time, however, it is said never to have been entirely extinct.

In 1600, a changeable star in the neck of the Swan, was observed by Jansenius. The same was observed and its place determined by Riciolus in 1616, 1621, and 1624. But from 1640 to 1650 it was invisible. It had several instances of appearing and again vanishing, prior to the year 1715, when it reappeared as a star of the sixth magnitude, its present appearance.

In 1604, a new star was discovered by Kepler and some of his friends near the head of Serpentarius. It exhibited a bright and sparkling appearance, beyond any they had before seen. Assuming the different colors of the rainbow, it appeared every moment changing, except near the horizon, where it generally appeared white. It was near Jupiter in October of that year, and surpassed that planet in magnitude, but disappeared before the following February.

Several other stars have appeared, vanished, and reappeared; some of them in regular succession. Such changeable stars may be suns having extensive spots. Stars of this kind, by a regular rotation on their axes, may alternately present their dark and luminous sides. "Maupertuis is of opinion that some stars, by their prodigious quick rotation on their axes, may not only assume the figure of oblate spheroids, but, by their great centrifugal force arising from such rotation, they may become of the figure of millstones, or reduced to flat circular plates, so as to be quite invisible when their edges are turned toward us; as Saturn's ring is in such positions. But when any eccentric planets or comets go round any flat star in orbits much inclined to its equator, the attraction of the planets or comets in their perihelia, must alter the inclinations of that star, on which occasion it will appear more or less large and luminous, as its broad side is more or less turned toward us."—*Ferguson.*

The propriety of the term *fixed*, as applied to the stars, seems rendered at least doubtful by the observations of modern astronomers. An advancement of the solar system, in absolute space, is now considered certain. It was observed by Halley and Cassini. The first explanation of it was given by Mayer. But to point out the region in the heavens to which the solar system is advancing, was reserved to Dr. Herschel. "He has examined this subject with his usual success, and has certainly discovered the direction in which our system is gradually advancing. He found that the apparent proper motion of about forty-four stars out of fifty-six, is very nearly in the direction which would result from a motion of the Sun toward the constellation Hercules, or more accurately, to a place in the heavens, whose right ascension is 250° 52 30″, and whose north polar distance is 40° 22′."

The stars, according to their magnitude, have been arranged into six classes or orders. The largest are called *stars of the first magnitude*; next to these are those of the *second magnitude*; thus decreasing to the *sixth*. Of course, the least stars belong to the sixth magnitude. Sometimes, however, in modern and even popular works, we find allusion to stars of the seventh or eighth magnitude. Considerable difference may be perceived in stars of the same class, some being much larger and more brilliant than others.

The arrangement of stars into magnitudes, was made long before the invention of telescopes. Stars unseen without the assistance of these, are called *telescopic stars*.

Another happy arrangement of the stars has been handed down to us from great antiquity. By a powerful imagination, the early cultivators of astronomy conceived companies of stars as having the form of certain animals, or other sensible objects; and hence they divided the starry sphere into constellations, each including stars of different magnitudes. According as the forms appeared to their imagination, they applied names to the different constellations. Thus one constellation was called *Leo*, another *Bootes*, and another *Orion*. Stars not included in any constellation are called *unformed* stars.

The animal, or other object of each constellation, is represented on the celestial globe, and the proportion of the stars belonging to each, denoted by the letters of the Greek alphabet, according to the plan adopted by Bayer, a German, in his *Uranometria*, a large celestial atlas. Thus, the largest star of the constellation is denoted by *Alpha*, the second by *Beta*, the third by *Gamma*, and thus on in alphabetical order.

The classing of stars, however chimerical, is of vast importance, as it enables the astronomer to designate the place of a star, a planet, or a comet, at any time, as easily as a geographer can that of a hamlet or a town.

From Cygnus, the Swan; Phenix, the Phenix; Piscis Australis, the Southern Fish; Leo, the Lion; and Crux, the Cross, as they are represented on a common celestial globe, the student may form some idea of that imagination by which the stars were arranged into constellations. Probably in Leo, or any other constellation viewed in the heavens, he will discover but little similarity between the figure presented by the stars, and the animal or other object by which they are represented.

Forty-eight of the constellations are reckoned ancient. Of these, 12 are in the zodiac, 21 to the north, and 15 to the south of it. The whole number of constellations has been reckoned 92. Of these, 12 are in the zodiac, 35 are north, and 45 south of that circle.

In each part of the following table the ancient constellations are placed first.

CONSTELLATIONS IN THE ZODIAC.

Aries, the Ram.
Taurus, the Bull.
Gemini, the Twins.
Cancer, the Crab.
Leo, the Lion.
Virgo, the Virgin.
Libra, the Scales.
Scorpio, the Scorpion.
Sagittarius, the Archer.
Capricornus, the Goat.
Aquarius, the Water-bearer.
Pisces, the Fishes.

CONSTELLATIONS NORTH OF THE ZODIAC.

Ursa Minor, the Little Bear.
Ursa Major, the Great Bear.
Draco, the Dragon.
Cepheus.
Boötes.
Corona Borealis, the Northern Crown.
Hercules.
Lyra, the Harp.
Cygnus, the Swan.
Cassiopeia, the Lady in her Chair.
Perseus.
Auriga, the Wagoner.
Serpentarius, the Serpent-bearer.
Serpens, the Serpent.
Sagitta, the Arrow.
Aquila, the Eagle.
Antinous.
Delphinus, the Dolphin.
Equi Sectio, the Horse's Head.
Pegasus, the Flying Horse.
Andromeda.
Triangulum, the Triangle.
Canes Venatici, the Greyhounds.
Cor Caroli, the Heart of Charles.
Triangulum Minus, the Little Triangle.
Musca, the Fly.
Lynx.
Leo Minor, the Little Lion.
Camelopardalis, the Camelopard.
Mons Mænalus, the Mountain Mænalus.
Scutum Sobeiski, Sobeiski's Shield.
Hercules cum Ramo et Cerbero.
Taurus Poniatowski, Poniatowski's Bull.
Vulpecula et Anser, the Fox and the Goose.
Lacerta, the Lizard.

CONSTELLATIONS SOUTH OF THE ZODIAC.

Cetus, the Whale.
Orion.
Eridanus.
Lepus, the Hare.
Canis Major, the Great Dog.
Canis Minor, the Little Dog.
Argo.
Hydra, the Water-Serpent.
Crater, the Cup.
Corvus, the Raven.
Centaurus, the Centaur.
Lupus, the Wolf.
Ara, the Altar.
Corona Australis, the Southern Crown.
Piscis Australis, the Southern Fish.
Phenix.
Officina Sculptoria, the Engraver's Shop.
Hydrus, the Water-Snake.
Farnax Chemica, the Chemical Furnace.
Horologium, the Time-Keeper.
Reticulus Rhomboidalis.
Dorado vel Ziphias, the Sword-Fish.
Cela Praxitelis, the Engraver's Tool.
Columba Noachi, Noah's Dove.
Equuleus Pictorius, the Painted Colt.
Monoceros, the Unicorn.
Chameleon.
Pyxis Nautica, the Mariner's Compass.
Piscis Volans, the Flying-Fish.
Sextans, the Sextant.
Robur Carolinum, the Royal Oak.
Machina Pneumatica, the Wind Instrument.
Crosiers el Cruzero.
Apis Musca, the Bee or Fly.
Apus vel Avis, the Bird of Paradise.
Circinus, the Compass.
Quadra Euclidis, Euclid's Square.
Triangulum Australe, the Southern Triangle.
Telescopium, the Telescope.
Pavo, the Peacock.
Indus, the Indian.
Microscopium, the Microscope.
Octans Hadleianus, Hadley's Octant.
Grus, the Crane.
Toucan, the American Goose.

The Galaxy.

The Galaxy, or *Milky-Way*, is a luminous zone in the heavens. The beautiful cloudy whiteness by which it is distinguished is found by modern astronomers to proceed from the collected rays of innumerable stars not discernible by the naked eye. "That the Milky-Way," says Dr. Herschel, "is a most extensive stratum of stars of various sizes admits no longer of the least doubt."

A group of stars is a collection of them of any figure, closely compressed together, like the trees in a crowded forest.

Clusters of stars are regarded by Dr. Herschel among the most magnificent objects in the heavens. They differ from groups in their beautiful and seemingly artificial arrangement.

Nebulæ are light spots in the heavens, sometimes denominated *cloudy stars*. Some of them are found to be clusters of telescopic stars. The most noted nebula was discovered by Huygens in 1656. It is between the two stars in the sword of Orion. In one part of it, a bright spot upon a dark ground seems to be an opening into a brighter and more distant region. Nebulæ were discovered by Dr. Halley and others. "But to Dr. Herschel," says Enfield, "are we indebted for catalogues of two thousand nebulæ and clusters of stars, which he himself has discovered." Dr. Brewster says, "two thousand five hundred."

What an astonishing view of the works of creation is opened upon us by the night! With wonder and delight we greet the return of day. The beauty, and even the sublimity of this world are lighted up to us by the splendor of the morning. But how surpassed are these by the infinite grandeur presented to our view by the *nocturnal* heavens! To the night we are indebted for the most exalted conceptions we can form of the immensity and sublimity of Jehovah's works. We cannot contemplate them without the most profound awe! We behold, not a solitary world, but a system of worlds, kept in perpetual harmony by the Sun; not one Sun and one system only, but millions of Suns and of systems, ranged in endless perspective, all revolving in harmonious order! How inconceivably great, and wise, and good must be the Author and Governor of such a universe.

Latitude and Longitude.

Latitude, as before stated, is the distance north or south from the equator. It is reckoned on the meridian in degrees; which, like those of all other circles, are subdivided into minutes, and again into sexagesimal parts. The center of the meridian, like that of the equator and other great circles of the globe, is considered at the center of the Earth.

The great circles of the globe, extended into the visible heavens, are considered as celestial circles, always lying in the same plane with those on the Earth. The position of the heavenly bodies, therefore, in regard to these circles, may be used in determining the latitude and longitude of places.

The latitude of a place may be determined by finding the distance of its zenith from the celestial equator. If, therefore, the zenith distance of a heavenly body and its declination be known, the latitude of the place of observation may be ascertained.

The declination of a heavenly body, as before defined, is its distance north or south from the celestial equator. The zenith distance of a heavenly body may be obtained by observing its meridian altitude, or by two altitudes. Four corrections are required in finding the altitude of the Sun or Moon: *semi-diameter*, *depression of the horizon*, *parallax*, and *refraction*. The semi-diameter and parallax of a planet can be but a few seconds. They are imperceptible in a star.

Suppose that on the 4th of July, 1831, the Sun's declination was found to be 22° 55′ 39″ north, when it passed the meridian of New York; and at that time the Sun's true zenith distance was found to be 17° 46′ 21″ north, what is the latitude of that city?

Declination north, ...	22° 55′ 39″
Zenith distance, ...	17° 46′ 21″
Answer, ...	40° 22′ 00″

If Arcturus, the noble star mentioned in the book of Job, be in 20° 20′ north declination, as placed on the British celestial globe, and be observed to pass the meridian of Boston 22° 3′ north of the zenith, what is the latitude of the city?

Declination north, ...	20° 20′
Zenith distance, ...	22° 3′
Answer, ...	42° 23′

With a little attention the student may easily determine whether he ought to add or subtract in making these calculations. If, in the last example, the declination had been 20° 20′ *south*, the zenith distance would have been 62° 43′, and the declination must have been subtracted to find the latitude of the place.

The latitude of a place may be determined by observing the altitude of its elevated pole. The altitude is always equal to the latitude of the place of observation. At this time the north pole of the Earth points nearly to a particular star, well known as the *north* or *pole star*. According to Dr. Flint, in his Survey, the declination of this star in 1810 was 88° 17′ 28″, with an annual increase of 19½″. Hence its declination on the 1st day of January, 1831, was 88° 24′ 17″, and its distance from the pole 1° 35′ 43″. Let the altitude of this star above and below the pole be taken. Half the sum of these altitudes added together is the altitude of the pole, and equal to the latitude of the place.

Semi-diameter and depression of the horizon have been mentioned as necessary corrections in determining latitude, and not explained in separate articles.

The semi-diameter of the heavenly body is the angle under which the semi-diameter of the body appears at the Earth. The distance of the limb being taken in ascertaining the altitude of the Sun or Moon, the semi-diameter is necessarily applied in order to reduce it to the center of the body.

Depression of the horizon is caused by the eye of the observer being elevated. When a man stands uprightly, he looks down on the horizon which touches the Earth at his feet. It must be apparent, that the higher the eye is elevated, the farther below the horizon, touching the surface of the Earth beneath it, may a heavenly body be seen.

Longitude on the Earth's surface is the distance east or west from some fixed meridian, assumed as first. Like latitude, it is reckoned in degrees, minutes, and sexagesimal parts.

The best method of determining longitude has long been an object of inquiry by the mariner and the geographer, the mechanic, the statesman, and the philosopher.

Philip III. of Spain, we are informed, offered a reward of a hundred thousand crowns for the discovery of longitude. The States of Holland, then the rival of Spain, soon after followed the example. During the minority of Lewis XV., the Regent of France offered a great reward for the discovery of longitude at sea. About the year 1675, in the time of Charles II. of England, the royal observatory was built at Greenwich. Mr. Flamstead was appointed astronomer royal. Instructions were given to him and his successors, "that they should apply themselves with the utmost care and diligence to rectify the tables of the motions of the heavens, and the places of the fixed stars, in order to find out the so much desired longitude at sea for the perfecting of the art of navigation."

In 1714, the British parliament offered £10,000 for the discovery of longitude if the method determined it to 1°; £15,000 if it determined it to 40′; and £20,000 if it determined it to 30′, with a proviso, that if such method extended but to 80 miles adjoining the coast, the proposer should have but half the reward. On this act Mr. John Harrison received the premium of £20,000 for his time-keeper. Several acts were passed in the reign of George II. and George III. for the encouragement of finding longitude. An act passed in 1774, said to be the last of that government on the subject, repealing all the former acts. This act diminishes the premium to half the first great offer.

The United States have not been inattentive to the subject of longitude; so far, at least, as respects the establishment for themselves of a first meridian. In the year 1809, Mr. Lambert, of Virginia, presented to Congress a memorial on the subject of longitude. He commences by stating, "that the establishment of a first meridian for the United States of America, at the permanent seat of government, by which a further dependence on Great Britain, or any other foreign nation, for such a meridian, may be entirely removed, is deemed to be worthy the consideration and patronage of the national legislature." An interesting report on this memorial was made in March, 1810, by a select committee of the House of Representatives, of which Mr. Pitkin, of Connecticut, was chairman. An extract from this report may deserve a place even in a compendium of astronomy:

"The committee have deemed the subject worthy the attention of Congress, and would, therefore, beg leave to observe, that the necessity of the establishment of a first meridian, or a meridian which should pass through some particular place on the globe from which geographers and navigators could compute their longitude, is too obvious to need elucidation.

"The ancient Greek geographers placed their first meridian to pass through one of the islands, which by them were called the Fortunate Islands, since called the Canaries. Those islands were situated as far west as any islands that had been discovered, or were known by ancient navigators in that part of the world.

"They reckoned their longitude east from Hera, or Junonia, supposed to be the present island of Teneriffe.

"The Arabians, it is said, fixed their first meridian at the most westerly part of the continent of Africa. In the fifteenth and sixteenth centuries, when Europe was emerging from the dark ages, and a spirit of enterprise and discovery had risen in the south of Europe, and various plans were formed and attempts made, to find a new route to the East Indies, geographers and navigators continued to calculate longitude from Ferro, one of the same islands, though some of them extended their first meridian as far west as the Azores, or Western Islands.

"In more modern times, however, most of the European nations, and particularly England and France, have established a first meridian to pass through the capital, or some place in their respective countries, and to which they have lately adapted their maps, charts, and astronomical tables.

"It would, perhaps, have been fortunate for the science of geography and navigation, that all nations had agreed upon a first meridian, from which all geographers and navigators might have calculated longitude; but as this has not been done, and, in all probability, never will take place, the committee are of opinion that, situated as we are in this western hemisphere, more than three thousand miles from any fixed or known meridian, it would be proper, in a national point of view, to establish a first meridian for ourselves; and that measures should be taken for the eventual establishment of such a meridian in the United States.

"In examining the maps and charts of the United States, and the particular states, or their sea-coasts, which have been published in this country, the committee find that the publishers have assumed different places in the United States as first meridian. This creates confusion, and renders it difficult, without considerable calculation, to ascertain the relative situation of places in this country. This difficulty is increased by the circumstance, that in Louisiana, our newly acquired territory, longitude has heretofore been reckoned from Paris, the capital of the French empire.

"The exact longitude of any place in the United States being ascertained from the meridian of the observatory at Greenwich, in England, a meridian with which we have been conversant, it would not be difficult to adapt all our maps, charts, and astronomical tables, to the meridian of such place. And no place, perhaps, is more proper than the seat of government."

The memorial, the report of the committee, and other papers were afterward referred to Mr. Monroe, then Secretary of State, and late President of the United States. His opinion fully accorded with that of the committee, in favor of establishing a first meridian for the United States, and that it should be at Washington, the seat of government.

The subject was afterward referred to another committee of the House of Representatives, of which Dr. Samuel L. Mitchill, of New York, was chairman. The report of this committee was in full accordance with the preceding sentiment, and in favor of the establishment of a first meridian at the seat of government.

To these high authorities, that of the illustrious Washington may be added, as stated by Mr. Lambert, in 1821, in his address on the subject to the President of the United States.

"The illustrious personage by whose name the metropolis of the American Union has been designated, unquestionably intended that the capital, situated at or near the center of the District of Columbia, should be a first meridian for the United States, by causing, during the first term of his presidency, the geographical position of that point, in longitude 0° 0′, and its latitude 38° 53′ north, as found by Mr. Andrew Ellicott, to the nearest minute of a degree, to be recorded in the original plan of the city of Washington."

Relative or apparent time differs four minutes for a degree, or one hour for every 15° of longitude. To the east, it is later; to the west, earlier. When it is noon with us, it is one P. M., 15° east; eleven, A. M. 15° west. Washington, according to Mr. Lambert, is 76° 55′ 30″ west of Greenwich. It is 6 h. 52 m. 18 s., A. M., at Washington when it is noon at Greenwich. Boston is 159° 32′ west of Calcutta. When it is noon at Boston it is 10 h. 38 m. 8 s., P. M., at Calcutta. If, therefore, by an exact time-keeper, or observation on the heavenly bodies, the time of day at the meridian, from which longitude is reckoned, and also the time at the place of observation, can be known, the difference converted into motion will show the longitude.

A good time-keeper, clock or watch, forms one method of computing longitude. Such time-keeper, set for any meridian, will not, when carried east or west, correspond with the apparent time. But its difference from the time at the place of observation, turned into motion, would, if true, give the longitude. If a ship, sailing from London to Boston, should set a watch for the meridian of London 6′ west of Greenwich, such watch, if perfectly accurate, would give the time 4 h. 43 m. 25 s., P. M., when the Sun is on the meridian at Boston. No clock or watch, however, yet invented, has been found entitled to perfect dependence. Even the time-keeper of Mr. William Harrison was found subject to considerable error when tried at the royal observatory by Dr. Maskelyne; though it had made a voyage from England to Barbadoes and back again, varying but 54 seconds in 156 days, or, as was thought, with proper allowance, only 15 seconds in that time.

The eclipses of Jupiter's satellites, happening very often, form an excellent method of determining longitude on land. Like those of the Moon, they are seen at the same absolute time in all places where they are visible. The difference in relative time, then, will show the longitude. Suppose an eclipse of the 4th satellite of Jupiter be set in the Nautical Almanac published for Greenwich at 4 h. 25 m., A. M., on a particular day, and the same is observed in the United States at 11 h. 17 m. 18 s., P. M., of the preceding day, what is the difference of longitude?

4 h.	25 m.	0 s.
—11 h.	17 m.	18 s.
5	7	42

In making this subtraction, it will be perceived, from the nature of the case, that 12 must be added to the hours of the minuend, or upper number. Convert 5 h. 7 m. 42 s. into motion, by allowing 15° for each hour, 1° for every 4 minutes, and 1 minute for every 4 seconds, and so on for thirds, you have the difference of longitude 76° 55′ 30″.

It is said the difficulty of observation at sea renders eclipses of Jupiter's satellites of but little practical utility to the mariner in computing longitude.

Lunar observations form another method of determining longitude. This method is a great modern improvement in navigation. The idea is not very modern. "M. de la Lande mentions certain astronomers, who, above two hundred years ago, proposed this method, and contended for the honor of the discovery; but its present state of improvement and universal practice he very justly ascribes to Dr. Maskelyne." This last mentioned astronomer first proposed and superintended the construction of the Nautical Almanac. In this the angular distance of the Moon from the Sun and certain fixed stars is inserted for every third hour in the day, calculated for the meridian of Greenwich. "If, therefore, under any meridian, a lunar distance be observed, the difference between the time of observation and the time in the Almanac when the same distance was to take place at Greenwich, will show the longitude." The stars selected for the Almanac are nine, viz.: the Alpha, or first star of Aries, Aldebaran of Taurus, Pollux of Gemini, Regulus of Leo, Spica of Virgo, Antares of Scorpio, Altair of Aquila, Fomalhaut of Piscis Australis, and Markab of Pegasus. The Nautical Almanac is annually published in England by the commissioners of longitude.

For practice in finding longitude, with the necessary tables, the student is referred to Dr. Bowditch's useful work, the "Practical Navigator."

Except a small variation on account of the spheroidical figure of the Earth, degrees of latitude remain the same, or of equal length, on every part of the globe. But those of longitude decrease from the equator to the poles, where they become extinct. The number of degrees in a circle of longitude is the same in all latitudes; but the number of miles in a degree continually lessens each way from the equator. The student versed in trigonometry may be informed that the proportion is—as radius is to the cosine of any given latitude, so is the number of miles in a degree of longitude at the equator to the number of miles in a degree of longitude at such latitude.

Meteors.

In some astronomical works are to be found accounts of lightning, thunder, clouds, aurora borealis, and even of wind, rain, snow, and hail. These, though highly important, and deserving the attention of the chemist and the student in general philosophy, seem not connected with astronomy, nor deserving a place in a work intended to be exclusively astronomical.

But *aerolites*, or *falling stones*, seem worthy of some notice, even in a compendium of astronomy. "It must be reckoned," says Rees's Cyclopædia, "among the wonders of the age in which we live, that considerable portions of these heavenly bodies are now known to have descended to the Earth. So wonderful and unexpected an event was at first received with incredulity and ridicule; but we may now venture to consider the fact as well established as any other hypothesis of natural philosophy, which does not actually admit of mathematical demonstration."

One of the earliest accounts we have of these phenomena is given by Livy, in his History of Rome. He tells us that, in the time of Tullus Hostilius, the successor of Numa, and third king of Rome, it was announced to the king and to the fathers, that it rained with stones on mount Albanus; that these stones fell from heaven not otherwise than when the winds drive the hail thick to the Earth.

Pliny mentions, that a large stone fell in Thrace, in the second year of the seventy-eighth Olympiad.

Three large stones are said to have fallen in Thrace, in the year before Christ 452.

It would be useless to dwell on the numerous accounts of these phenomena handed down to us from great antiquity. But it may be proper to give a few instances of the falling of these stones in modern times, received on the authority of different authors.

A shower of falling stones, 1,200, one of 120 lbs., is related to have happened near Padua, in Italy, in 1510.

April 5, 1804, a stone of this kind fell near Glasgow, in Scotland. Several gentlemen of the university well ascertained the particulars of this phenomenon.

But New England affords one of the best authenticated accounts of these wonderful stones. Professors Silliman and Kingsley visited and carefully examined every spot where it was ascertained these stones had fallen. The principal fall was within the bounds of Weston, in Connecticut; though the most northerly was in Huntingdon, on the borders of Weston. Something of the original account deserves to be extracted: "The meteor which has so recently excited alarm in many, and astonishment in all, first made its appearance in Weston, about a quarter or half-past six o'clock, on Monday, the 14th of December, 1807. The morning was somewhat cloudy, mingled with spots of clear, a space of 15° along the northern horizon perfectly clear; there was little or no light, except from the Moon, just setting.

"Judge Wheeler was passing through the inclosure adjoining his house, with his face toward the north, and his eyes on the ground, when a sudden flash across the northern sky made him look up; he immediately discovered a globe of fire passing behind the first cloud, which was very dark, and obscured the meteor. In this situation its appearance was distinct, like the Sun seen through a mist. Its progress was not so rapid as that of common meteors and shooting stars. When it passed the clear sky it flashed with a vivid light, not so intense as lightning in a thunder-storm, but like what is called *heat lightning*. Its surface was apparently convex. When not too much obscured by clouds, a conical train of paler light attended it waving, and in length about ten or twelve diameters of the body. In the clear sky, there was a brisk scintillation about it, like a firebrand carried against the wind. It disappeared about 15° short of the zenith, and the same number west of the meridian. It did not vanish instantaneously, but grew fainter, as a red-hot cannon-ball would do, cooling in the dark, only much more rapidly.

"About thirty or forty seconds after this, three loud and distinct reports, like those of a four-pounder, near at hand, were heard. They succeeded each other rapidly, and did not occupy above three seconds. Then followed a continual rumbling, like a cannon-ball rolling over a floor, sometimes louder and sometimes fainter."

There were six places where stones fell on this occasion; the most remote, nine or ten miles from each other. One fell on a rock of granite with a loud report. It was broken into fragments, thrown to the distance of thirty feet, and some part reduced to powder. One mass of this fall was found sunk two feet below the surface of the ground. Of the masses found, two weighed 35 lbs. each; one, 25 lbs. From the fragments found of one, it was thought it must have weighed nearly 200 lbs.

A great similarity is found in these stones, when examined chemically, in different parts of the world where they had fallen. But they are very different from the other stones on the surface of the Earth.

Much speculation has been excited respecting the origin of the *aerolites*. Prior tells us, "The most prevalent opinion among modern philosophers is, that they are concretions actually formed in the atmosphere itself." But that such solid and weighty bodies should be formed in the *rare* medium of the atmosphere, would be more wonderful than the falling stones themselves. Some have supposed they originate in the asteroids.

Perhaps the most probable opinion is that of La Place, "that the stones are projected by lunar volcanoes within the sphere of terrestrial attraction." The Moon is but 240,000 miles from the Earth. The force of attraction in different bodies is as the quantity of matter. Of this, that of the Earth is to that of the Moon as 1 to .025. Hence the neutral ground between the two bodies must be vastly nearer the Moon than the Earth. Whenever matter thrown up by a volcano from the Moon, passes this ground, it must irresistibly be drawn to the Earth.

The luminous meteors, usually denominated *shooting stars*, seem different in their origin, and to be of species different from *aerolites*, or falling stones. In some instances in which these meteors have appeared in immense numbers, for many hours in succession, and over an extensive region, no falling stones have been discovered, nor any traces been found where they have marked the Earth.

Several noted instances of these meteors have occurred in modern times. An account of one is given by Humboldt, witnessed by himself and Bonpland at Cumana, in South America. "The night of the 11th of November, 1779, was cool and extremely beautiful. Toward the morning, from half after two, the most extraordinary luminous meteors were seen toward the east. Bonpland, who had risen to enjoy the freshness of the air in the gallery, perceived them first. Thousands of bolides, fireballs, and falling stars, succeeded each other during four hours. Their direction was very regular from north to south. They filled a space in the sky extending from the true east 30° toward the north and south; some of them attained a height of 40°, and all exceeded 25° or 30°. There was very little wind, and no trace of clouds to be seen."

Phenomena similar to those seen by Humboldt were extensively observed on the Atlantic ocean and the Gulf of Mexico, on the 12th of November, 1799. The following account of these has been extracted into our papers from the Newburyport *Herald* of that year. It was given by Captain Woodman, of the brig Nymph:

"On my passage home from the island of St. Domingo, being in lat. 29° lon. 70°, on the 12th of November, at half-past one o'clock in the morning, the weather being very clear and pleasant, the wind to the eastward, the moon near the full, and shining very bright, observed the stars to shoot in great numbers from every point of the compass; and at two o'clock the whole atmosphere appeared to be full of stars—I may say thousands of thousands—shooting and blazing in all directions—in a most extraordinary and alarming manner, and so continued till daylight. On my arrival at the Vineyard, I met with several masters of vessels, who were on their passage at the same time, and said that the stars made the same appearance to them on the night above mentioned, though they were then several degrees to the northward of me. This account was dated Newburyport, December 20, 1799.

These phenomena of November 12th, 1799, were witnessed by Mr. Ellicott when a commissioner to settle the boundary line between the United States and the Spanish possessions in North America. He describes them as "grand and awful. The whole heavens appeared as if illuminated with sky-rockets, which disappeared only by the light of the sun after daybreak. The meteors, which, at any one instant of time, appeared as numerous as the stars, flew in all possible directions, except from the Earth."

Captain Hammond and his crew, when at Mocha in Arabia, on the 12th of November, 1832, witnessed a similar display of luminous meteors, and described them in similar language.

The citizens of these United States will long remember the night of the 12th, or the morning of the 13th of November, 1833. The brilliant exhibition of luminous meteors which adorned the canopy from the St. Lawrence to the Gulf of Mexico, and from the Atlantic to the Rocky Mountains, perhaps has never been surpassed in the time of its continuance, or in the richness and grandeur of its appearance.

The display seems to have commenced earlier as seen from the southern than from the northern sections of the Union. The following account is extracted from the Charleston Mercury of November 14th, 1833:

"Those who were up before the dawn yesterday witnessed a most glorious sight, one glance at which were worth ten years of common life. The temperature of the day before had been oppressive, the mercury ranging as high as 78 degrees. At night the atmosphere became cooler, but not so much so as to make a fire necessary for comfort. About ten o'clock, P. M., shooting stars were observed to succeed each other with unusual frequency, and continued to appear at short intervals during the night. But at about three o'clock in the morning the wind, which had been from the west, having changed, and blowing with some freshness from the northeast, there was a burst of splendor throughout the firmament, and its entire concave was thronged with innumerable meteors streaming athwart each other toward the horizon in every quarter, leaving long trains of light as if millions of rockets were incessantly exploding. The literal shower of stars continued till daylight, exploding in glittering confusion as if the whole starry host were reeling madly from their spheres.

"While this grand and beautiful spectacle lasted, a permanent light as strong as moonlight was thrown through the windows of our chambers, and, although the sky was without a cloud, there were flashes, from time to time, of the most vivid lightning. The unusual light roused many from their beds, some supposing that the city was on fire. While every spectator must have gazed with feelings of awe, some were astonished into the liveliest terror."

There is a striking coincidence of expression in the description of these phenomena in different and distant parts of the country. How far they were visible beyond the limits of the United States is not yet ascertained. They are described as having appeared splendid at St. George's Bank, three hundred miles from the coast.

The astonishing displays of meteors seen at different times, 1779, 1799, 1832, and 1833, all appeared at the same time of the year, or within a single day of the same time. This is worthy of notice and philosophical inquiry.

The cause of these phenomena, these *showers* of luminous meteors, evidently distinct from aerolites, seems now demanded from every quarter by the wise and the simple, the learned and the unlearned. Many hypotheses have been formed on the subject. Dr. Halley conjectured "that a stratum or train of inflammable vapor, gradually raised from the Earth and accumulated in an elevated region, suddenly took fire, and, burning like a train of gunpowder, exhibited the meteoric phenomena." The late President Clap of New Haven, supposed fiery meteors to be terrestrial comets revolving about the Earth. But his attention must have been fixed on others, and not on these *showers* of meteors. A learned professor wishing for more information concerning them, thinks "it evident that the point from which the fireballs emanated was beyond the limits of our atmosphere; that the balls were projected obliquely into the atmosphere; that they were not at first luminous, but became so, and more so, as they reached the denser parts of the atmosphere, until they exploded or burst asunder; and that they consisted of luminous vapor, such as after explosion remained suspended in the air."

The most probable conjecture seems to be, that the meteors of 1833 were electrical phenomena.

The state of the atmosphere is to be considered. The weather was warm for some time previous to the display. On the day preceding, it was almost sultry. In the afternoon there were gusts of wind attended with sudden showers of rain and lightning. "The atmosphere seemed to be saturated with electricity."

To account for these meteors on the principles of electricity is not *new*. Dr. Rees informs us that "Dr. Blagden proceeds to explain these meteors on the hypothesis that they are electrical phenomena. His arguments are, 1st, from the great rapidity of their motion, which seems to exceed any other we are acquainted with besides electricity; 2dly, from certain electrical phenomena which sometimes accompany these meteors; and 3dly, from the connection which they have with the aurora borealis. Dr. Blagden concludes that there are three regions of the atmosphere distinguished by electrical phenomena peculiar to each; 1st, the lowest region, in which the thunder and lightning occur; 2dly, the middle region, where the fireballs and shooting stars are observed; and 3dly, the highest region, where the aurora borealis displays a peculiar kind of electrical agency." It is worthy of remark, that many accounts mention flashes of lightning during the display of meteors. It is very probable that the great meteor which passed over England on the 18th of August, 1783, was an electrical phenomenon. It went with immense rapidity, more than one thousand miles in about half a minute.

SELECTIONS FROM RYAN'S ASTRONOMY.

On Comets.

1. Comets are planetary bodies moving about the Sun in elliptic orbits, and following the same laws as the planets; so that the areas described by their *radii vectores* are equal in equal times.

When a comet appears, the observations to be made for ascertaining its orbit are of its declinations and right ascensions, from which the geocentric latitudes and longitudes are obtained. These observations of right ascension and declination must be made with an equatorial instrument, or by measuring with a micrometer, the differences of the declination and right ascension of the comet and a neighboring fixed star. The observations, according to Dr. Brinkley, ought to be made with the utmost care, as a small error may occasion a considerable one in the orbit.

From the beginning of the Christian era to the present time, there have appeared not less than 500 comets; but the elements of not more than 99 have been computed, and of the latter number 22 passed between the Sun and Mercury in their perihelia; 40 between Mercury and Venus; 17 between Venus and the Earth; 16 between the Earth and Mars; and 4 between Mars and Jupiter.

The appearance of one comet has been several times recorded in history, viz., the comet of 1680. The period of this comet is 575 years. It exhibited at Paris a tail 62° long, and at Constantinople one of 90°. When nearest the Sun, it was only one-sixth part of the diameter of the sun distant from his surface; when farthest, its distance exceeded 138 times the distance of the Sun from the Earth.

2. As the orbits of the comets are very eccentric, the aphelion distance of a comet is so great, compared with its perihelion distance, that the small portion of the ellipse which it describes near its perihelion, or during its appearance, may, without any sensible error, be supposed to coincide with a parabola, and thus its motion during a short interval may be calculated as if that portion of the orbit was parabolical.

Dr. Halley makes the perihelion distance of the comet of 1680 to be to its aphelion distance, nearly as 1 to 22412; so that this comet was *twenty-two thousand four hundred and twelve times* farther from the Sun in its aphelion than in its perihelion.

According to the laws of Kepler, the sectors described in the same time by two planets, are to each other as the areas of their ellipses divided by the square of the times of the revolution, and these squares are as the cubes of their semi-major axes. It is easy to conclude, that if we imagine a planet moving in a circular orbit, of which the radius is equal to the perihelion distance of a comet, the sector described by the radius vector of the comet, will be to the corresponding sector described by the radius vector of the planet, as the square root of the aphelion distance of the comet is to the square root of the semi-major axis of its orbit, a relation which, when the ellipse changes to a parabola, becomes that of the square root of 2 to unity.

The relation of the sector of the comet to that of the imaginary planet is thus obtained, and it is easy by what has been already said, to get the proportion of this last sector to that which the radius vector of the earth describes in the same time. The area described by the radius vector of the comet may then be determined for any instant whatever, setting out from the moment of its passage through the perihelion, and its position may be fixed in the parabola which it is supposed to describe. Nothing more is necessary, but to deduce from observation the elements of the parabolic motions.

3. The *elements of a comet* are, the perihelion distance of the comet, the position of the perihelion, the instant of its passage through the perihelion, the inclination of its orbit to the plane of the ecliptic, and the position of its nodes.

Elements of the Comet of 1811.

Time of Comet's passage through its perihelion, September, ...	12*d.* 9*h.* 48*m.*
Place of the perihelion, ...	74° 12′ 00″
Distance of the perihelion, ...	1 .02241
Place of the ascending node, ...	140° 13′ 00″
Inclination of the orbit to the plane of the ecliptic, ...	72 12 00
Its heliocentric motion retrograde.	

The investigation of these five elements presents much greater difficulties than that of the elements of the planets, which being always visible, and having been observed during a long succession of years, may be compared when in the most favorable position for determining these elements, instead of which comets appear only for a short time, and frequently in circumstances where their apparent motion is rendered very complicated by the real motion of the Earth, which always carries us in a contrary direction.

Notwithstanding all these difficulties, it is possible to determine the elements of the orbits of comets by different methods. Three complete observations are sufficient for this object; others only serve to confirm the accuracy of these elements, and the truth of the theory which has been just explained. Above four-and-twenty comets, the numerous observations of which are exactly represented by this theory, have confirmed it beyond all doubt. It appears, therefore, that comets which have been considered as meteors for many years, are of the same nature as planets; their motions and their returns are regulated by the same laws as planetary motions.

4. Comets do not always move in the same direction like the planets. The real, or heliocentric motion of some is direct, or according to the order of the signs; and of others, retrograde. But the geocentric motion of the same comet may be either retrograde or direct according to the position of the Earth with respect to the comet, and their relative velocities.

The heliocentric motion of half the comets whose elements have been computed, is retrograde, and of the others, direct. The inclination of their orbits is not confined within a narrow zone like that of the planetary orbits; they present every variety of inclination, from an orbit nearly coincident with the plane of the ecliptic, to that perpendicular to it.

A comet is recognized when it reappears by the identity of the elements of its orbit with those of the orbit of a comet already observed. If its perihelion distance, the position of its perihelion, its nodes, and the inclination of its orbit are very nearly the same, it is probable that the comet which appears is that which has been observed before, and which, having receded to such a distance as to be invisible, returns to that part of its orbit nearest to the Sun. The duration of the revolution of comets being very long, and having been observed with very little care till within about two centuries, the period of the revolution of one comet only is known with certainty, that of 1682, which had been already observed in 1607 and 1531, and which has reappeared in 1759. This comet takes about 76 years to return to its perihelion; therefore, taking the mean distance of the Sun from the Earth as unity, the greater axis of its orbit is 35.9, and as its perihelion distance is only 0.58, it recedes from the Sun at least 35 times more than the Earth, describing a very eccentric ellipse. Its return to the perihelion has been longer by thirteen months from 1531 to 1607, than from 1607 to 1682; it has been 18 months shorter from 1607 to 1682, than from 1682 to 1759.

The real or heliocentric motion of this comet was retrograde, and the elements of the orbit deduced by Dr. Halley from the observations of Apian in 1531, of Kepler in 1607, and of himself in 1682, also the elements deduced from the observations in 1759, were as follows:

Passage through Perihelion.				Per. dist. Earth's per dist. unity.	Place of Perihelion.			Place of Node.			Inclination to ecliptic.	
		d.	*h.*		s.	°	′	s.	°	′	°	′
1531 . . .	Aug.	21	18	.567	10	1	39	1	19	30	17	51
1607 . . .	Oct.	26	8	.587	10	2	16	1	20	21	17	2
1682 . . .	Sept.	14	4	.583	10	2	52	1	21	16	17	58
1759 . . .	Mar.	12	14	.585	10	3	8	1	23	45	17	40

This comet was retarded by the action of Jupiter, as Dr. Halley had foretold. This retardation was more exactly computed by Clairaut, who also calculated the retardation by Saturn. The result of his computation published before the return of the comet, fixed April 15 for the time of the passage through perihelion: it happened on March 12. Dr. Halley's computation appears also very exact, when it is considered that he did not allow for the retardation by Saturn. As had been predicted by Dr. Halley, this comet reappeared in 1835.

The return of some other comets has been suspected: the most probable of these returns was that of the comet of 1532, which has been believed to be the same with that of 1661, and the revolution of which was fixed at 129 years; but this comet not having reappeared in 1790, as was expected, there is great reason to believe that these two comets were not the same.

The preceding matter has been principally extracted from *Laplace's System of the World.*

An ingenious computation has been made by Laplace, from the doctrine of chances, to show the probability of two comets being the same, from a near agreement of the elements. It is unnecessary to detail at length the method here. It supposes that the number of different comets does not exceed one million, a limit probably sufficiently extensive. The chance that two of these, differing in their periodic times, agree in each of the five elements within certain limits, may be computed, by which it was found to be as 1200 to 1. that the comets of 1607 and 1682 were not different, and thus Halley was justly almost confident of its reappearance in 1759. As it did appear then, we may expect, with a degree of probability approaching almost without limit to certainty, that it will reappear again at the completion of its period.

But with respect to the comet predicted for 1789, from the supposition that those of 1661 and 1532 were the same, the case is widely different. From the discrepancy of the elements of these comets, the probability that they were the same is only 3 to 2, and we cease to be surprised that we did not see one in 1789. See Dr. Brinkley's Elements of Astronomy.

Comets that appeared in 1264 and 1556 are supposed to have been the same, whence this comet may again be expected in 1848.

A comet appeared in 1770 very remarkable from the result of the computations of Lexell, which indicated a period of only 5½ years; it has not been observed since. There can be no doubt that the periodic time of the orbit which it described in 1770, was justly determined; for M. Burckhardt has since, with great care, recomputed the observations, and his result gives a periodic time of 5½ years.

Lexell has remarked, that this comet, moving in the orbit he had investigated, must have been near Jupiter in 1767, and would also be very near it again in 1779; from whence he concluded that the former approach changed the perihelion distance of the orbit, by which the comet became visible to us, and that in consequence of the latter approach, the perihelion distance was again increased, and so the comet again became invisible, even when near its perihelion. This explanation has been in a manner confirmed by the calculations of Burckhardt, from formulas of Laplace. He has found, that before the approach of Jupiter, in 1767, the perihelion distance might have been 5.08, and that after the approach in 1779, it may have become 3.33, the Earth's distance being unity. With both these perihelion distances, the comet must have been invisible during its whole revolution. The perihelion distance in 1770 was 0.67.

This comet was also remarkable by having approached nearer the Earth than any other comet that has been observed, and by that approach having enabled us to ascertain a limit of its mass, or quantity of matter. Laplace has computed, that if it had been equal to the Earth, it would have shortened the length of our year by one-ninth of a day. Now it has been ascertained, by the computations of Delambre on the Greenwich observations of the Sun, that the length of the year has not been changed, in consequence of the approach of that comet, by any perceptible quantity; and thence Laplace has concluded, that its mass is less than one five-thousandth of that of the earth. The smallness of its mass is also shown by its having traversed the orbits of the satellites of Jupiter without having occasioned an alteration in their motions. From those and other circumstances, it seems probable that the masses of the comets are in general very inconsiderable; and therefore, as Dr. Brinkley remarks, that astronomers need not be under apprehensions of having their tables deranged in consequence of the near approach of a comet to the Earth or Moon, or to any bodies of the solar system.

5. The motion of a comet, like that of a planet, is accelerated when moving from its aphelion to its perihelion, and retarded from its perihelion to its aphelion. On account of the great eccentricity of a comet's orbit, its motion

in the perihelion is prodigiously swift, and in the aphelion proportionably slow.

The velocity of this comet in its perihelion was so great, that, if continued, it would have carried it through 124 degrees in an hour. But its actual hourly motion during that interval, before and after it passed its perihelion, was 81° 46′ 52″.

From Dr. Halley's determination of the orbit of this comet, it cannot be less than 13,000 millions of miles from the Sun when in its aphelion.

According to Pingre, the elements of the orbit of the comet of 1680 were as follows: this comet passed through its perihelion December 18th, at 1 minute 2 seconds after 12 o'clock, at noon mean time at Greenwich; place of the perihelion 8*s*. 22° 40′ 10″, or 22° 40′ 10″ of Sagittarius; and its distance from the Sun when in the perihelion, .00603, the mean distance of the Earth from the Sun being considered as unity or 1; the longitude or place of the ascending nodes 9 signs, 1° 57′ 13″, or 1° 57′ 13″ of Capricornus; and the inclination of the orbit to the plane of the ecliptic 61° 22′ 55″.

It appears from the great diurnal motion of some comets, that they must have come very near the earth. For, according to Regiomontanus, the comet of 1472 moved over an arc of 120° in one day. And the comet of 1759 described the apparent arc of 41° in the same interval of time.

The comet of 1811 was first seen at Viviers, by Flaugergues, on the 25th of March, and was visible till the end of May; it must have been very faint and near the horizon all the time, it having during that interval great southern latitude. The Earth was in about 5 degrees of Libra, on the 25th of March, and therefore the comet must be nearly in opposition to the Sun, which certainly was the most favorable position for seeing it. It was then moving toward its perihelion, but its motion being slow, and the Earth retreating from it, it was lost sight of when the Earth arrived at the beginning of Sagittarius. The comet passed the ascending node on July 11th, when the Earth was between Capricornus and Aquarius; it was then approaching its conjunction with the Sun, and was invisible from the end of May till the 31st of August, when, between 3 and 4 o'clock that morning, it was observed by Bouvard, at the imperial observatory; its right ascension was 147° 18′, and declination 32° 53′ north. The comet was first observed at Greenwich, on the 5th of September; its geocentric longitude at that time was 145° 3′ 10″, and its geocentric latitude 28° 36′ 39″. The comet was at its perihelion at a distance of 97,128,950 miles from the Sun on the 12th of September.

On October 2d, the comet was 26° 33′ from the perihelion; its heliocentric longitude was 41° 53′ and latitude 72° 1′; having two days before passed the higher part of its orbit, or 90 degrees from the node. The Earth at the same time was in about 9° of Aries; and the geocentric longitude of the comet was 174° 37′, and its geocentric latitude 54° 5′. The comet's distance from the Sun was 102,532,550, and from the Earth 120,413,930 miles. The comet was nearest the Earth on the 11th of October, when its distance was 113,630,450 miles, its apparent motion in longitude at this time was nearly four degrees in twenty-four hours. On the 12th, the comet was 37° 33′ from the perihelion, having a rapid geocentric motion in longitude, the direction of the Earth and comet conspiring to produce that effect. Its geocentric longitude was 203° 46′, and latitude 61° 39′; the Earth at the same time was 18° 40′ in the sign Aries. The comet's distance from the Sun was 108,342,464, and from the Earth 113,948,225 miles. On January 1st, 1812, the comet was 89° 11′ from the perihelion; its heliocentric longitude was 328° 15′, and latitude 23° 33′. The Earth was about 10° 21′ in Cancer; the greatest geocentric longitude of the comet was 312° 2′, and latitude 17° 18′. Its distance from the Sun was 190,520,000, and from the Earth 259,614,500 miles. See, for a delineation of a portion of this comet's orbit, Squire's Astronomy.

Though the real or heliocentric motion of this comet was not within the sphere of the Earth's orbit, yet its geocentric track, when referred to the ecliptic, crossed the orbit of the Earth; hence, the apparent place of the comet, during the greater part of the time it was visible, was toward the opposite part of the heavens to its true place.

From the true and apparent places of the comet given above, for particular days, its real and visible path may be traced upon the celestial globe. Dr. Herschel makes the planetary body of this comet not more than 428 miles in diameter; but the real diameter of the head he makes to be about 127,000 miles.

The apparent motion of this comet was direct, yet very unequal, for when it first became visible after passing the ascending node, it was nearly stationary, and the same about the time of its disappearance, but when nearest the Earth it equaled that of Mercury.

This comet was visible a longer time than almost any other upon record, and therefore none has ever afforded such certain means of information with respect to its orbit. Had its heliocentric motion been direct, it would have been visible much longer, and would have passed within 44,485,850 miles of the Earth, had it crossed the line of its nodes at the same time. The comet would then have appeared a large nebulous body, but without a tail, as that appendage would have been projected in a direct line from behind its body.

Creation a Proof of Divine Existence.

This is a conclusion which has been deduced by men of all nations, and in every period of the world. "There is no nation or people," says Cicero, "so barbarous and ignorant as not to acknowledge a powerful and Supreme Divinity."

1. It is as natural for the human understanding, in its original and unbiassed state, when contemplating the frame of the universe, to infer the existence of a Deity, as it is the property of the eye to distinguish light and colors, and of the ear to distinguish sounds. The principle from which this conclusion is deduced is exactly the same as that by which, from the contemplation of a building, we infer a builder, and from the elegance and utility of every part of the structure, we conclude that he was a wise and skillful architect; or that by which, from an inspection of a clock or watch, or any other piece of useful machinery, we infer not only the existence, but the qualities and attributes of the contriver and artificer. The man who is incapable of at once deducing such conclusions ought to be regarded as destitute of the reasoning faculty; and if we thus necessarily infer the cause from the effect in the case of human art, can we for a moment hesitate to ascribe the production of this amazing universe which surrounds us, to a Being of infinite knowledge, wisdom, and power, adequate to bring into existence such an immense and wonderful machine, and to preserve it in harmony, from age to age, amidst all its diversified and complicated movements? That ever a

doubt was entertained on this subject, is a plain proof that man has lost, in part, that light of reason and intelligence with which he was originally endued, or that he is sometimes urged on by depraved passions and a pride of singularity to utter sentiments which he does not sincerely believe. As Cicero long ago declared—"He who thinks the admirable order of the celestial orbs, and their constancy and regularity, on which the conservation and good of all things depend, to be void of a mind that governs them, he himself deserves to be accounted void of a mind." It is "the *fool*" alone, in the strictest sense of the word, whatever may be his pretended learning, who dares to declare "there is no God."

And as the universe demonstrates the *existence*, so it displays the *attributes* of the Eternal. The manifestation of himself to numberless orders of intelligent beings must have been the great end intended in bringing the universe into existence. This manifestation is made chiefly in *actions*—in actions which display greatness, wisdom and goodness, beyond all bounds. His greatness appears from the immensity of *power* which the universe exhibits. The power necessary to move a single planet in its course far transcends human conception. What, then, must be the energy and extent of that power which set in motion and still upholds all the planets, worlds, and systems dispersed throughout the spaces of infinitude! The highest created intelligence must be utterly overwhelmed and confounded when it attempts to contemplate or to grasp an idea of omnipotence. His knowledge, wisdom and unceasing agency are no less conspicuous in the arrangement and direction of every thing that exists in heaven and on earth. As his presence pervades all space, so his agency is displayed in the minutest movement of every part of the vast whole. This great and incomprehensible Being moves every atom, expands every leaf of the forest, decks every flower, conveys the sap through the ramifications of every tree, conducts every particle of vapor to its appointed place, directs every ray of light from the sun and stars, every breath of wind, every flash of lightning, every movement of the meanest worm, and every motion of the smallest microscopic animalculum; while at the same time he supports the planets in their courses, guides the comet in its eccentric career, regulates the movements of millions of resplendent systems, and presides in sovereign authority over unnumbered hosts of intelligent existence; directing all the mysterious powers of knowledge, virtue, and moral action to subserve the purposes of his will, and accomplish the ends of his moral government. In every department of this universe, likewise his *goodness* is displayed to unnumbered orders of beings, sentient and intellectual; for all the powers of intelligence and action possessed by every creature in heaven and on earth, from the archangel to the worm, and all the happiness they now or ever will enjoy, are derived from him as the uncreated source of all felicity.

Under this glorious and stupendous Being we live and move; our comforts and enjoyments, while passing through this transitory scene, are wholly in his hands, and all our prospects of enjoyment beyond the range of our earthly career are dependent on his mercy and favor. His omnipotent arm supports us every moment; every breath we draw, every pulse that beats within us, every muscular power we exert, every sound that strikes our ears, and every ray of light that enters our eye-balls, is dependent on his sovereign will. All that we hope for beyond the limits of time and throughout the revolutions of eternity depends upon his power, his wisdom, his benevolence and his promises. Were he to withhold the powers and agencies under which we now live and act, we could neither think nor speak, hear nor see, feel nor move; the whole assemblage of living beings in our world would be changed into immovable statues, and this earth transformed into a barren waste and an eternal solitude. To the service of this glorious Being all the powers and faculties with which he has endowed us ought to be unreservedly consecrated. As his highest glory and blessedness consist in bestowing benefits on his intelligent offspring, so we ought to be imitators of him in his boundless beneficence, by endeavoring to communicate happiness to all around us. "To do good, and to communicate, forget not; for with such sacrifices God is well pleased." To him, as the "Father of our spirits and the former of our bodies," is due the highest degree of our love and gratitude; on him we ought to rely for every blessing, and humbly resign ourselves to his disposal under every event; for "all things are of God," and all are conducted with supreme and unerring wisdom and goodness to an end immortal and divine.

2. The immensity and magnificence of the universe and the attributes of Deity it displays are considerations which ought to be taken into account in all our views of religion. There is a class of men who, in prosecuting scientific pursuits, wish to discard every thing that has a bearing on religion when deduced from the investigations of science, and can scarcely refrain from a sneer, when the arrangements in the economy of nature are traced to the agency of their All-wise and Omnipotent Creator; as if the objects which science professes to investigate had no relation to the views we ought to entertain of the Divinity, and ought never to be traced to their great first cause. On the other hand, there are many professed religionists who, from mistaken notions of piety, would set aside the study of the works of God, as having no connection whatever with the exercises of piety and the business of religion, and as even injurious to their interests. Both these classes of men verge toward extremes which are equally inconsistent and dangerous. The amazing fact, that creation consists of a countless number of magnificent systems and worlds beyond the comprehension of finite minds, ought not thus to be recklessly set aside in our views of God and of religion; for they are all the workmanship of ONE BEING, and they are connected together as parts of ONE grand system, of which the God we profess to worship is the supreme and universal governor. They present to the view of all intelligences the most glorious displays of his character and perfections, and consequently demand from us a corresponding sentiment of admiration and reverence, and a corresponding tribute of homage and adoration. Such enlarged prospects of the universe are therefore available for the loftiest purposes of religion and piety, and ought to enter as an element into all our views of the administration of the Almighty, and of that worship and obedience he requires from his rational offspring, unless we would be contented to render him a degree of homage far inferior to that which the manifestations of his attributes demand.

God is known only by the manifestations which he makes of his character and perfections. The highest created intelligences can know nothing more of the Divinity than what is derived from the boundless universe he has presented to their view, the dispensations of his providence to certain orders of beings, and the special revelations he may occasionally vouchsafe, on certain emergencies, to particular worlds. Had man continued in primeval innocence, the contemplation of the vast creation around him, with all its diversified wonders and beneficent tendencies, would have led him to form correct views of the attributes of his Almighty Maker, and of the moral laws by which his conduct should be regulated: but it does not follow, that because the study of nature is now of itself an insufficient guide to the knowledge of the Creator, and the enjoyment of eternal felicity, such studies are either to be thrown aside, or considered as of no importance in a religious point of view. To overlook the astonishing scene of the universe, or to view it with indifference, is virtually to "disregard the works of Jehovah, and to refuse to consider the operations of his hands." It is a violation of Christian duty, and implies a reflection on the character of the Deity, for any one to imagine that he has nothing to do with God considered as manifested in the immensity of his works; for his word is pointed and explicit in directing the mind to such contemplations. "Hearken unto this; stand still, and consider the wonderful works of God." "Lift up thine eyes on high, and behold who hath created these orbs." "Remember that thou magnify his works which men behold." "Great and marvelous are thy works, Lord God Almighty! Thy saints shall speak of the glory of thy kingdom and talk of thy power, to make known to the sons of men thy mighty operations and the glorious majesty of thy kingdom."

3. The Christian revelation, throughout all its departments, is not only consistent with the views we have taken of the universe, but affords direct evidence of the magnificence of creation, and of the myriads of beings with which it is peopled. Of this position we have exhibited some proofs in the remarks and illustrations which show at the same time the harmony which subsists between the discoveries of revelation and the discoveries which have been made in the system of nature. There is no other system of religion or pretended revelation that was ever propagated in the world to which such a characteristic belongs. If we examine the Mahomedan Koran, the Shasters of Bramah, the system of Confucius, the mythology of the Greeks and Romans, and every other Pagan code of religion, we shall find interspersed throughout the whole of them numerous sentiments, opinions, and pretended facts at utter variance with the true system of nature, and to what are known to be the established laws of the universe. This is strikingly exemplified in the extravagant stories and descriptions contained in the pretended revelations of Mahomet, and the absurd notions respecting the creation contained in the sacred books of the Hindoos, which assert that the universe consists of seven heavens and seven worlds, which are all at a future period to be absorbed into God; with many other absurdities. In opposition to all such foolish and absurd opinions, the inspired writings, when properly understood and rationally interpreted according to the rules of just criticism, are uniformly found to be perfectly consistent with the discoveries of science, and the facts which are found to exist in the system of the universe; and this correspondence and harmony ought to be considered as a strong presumptive evidence that the revelations of Scripture and the scenes of the material universe proceed from the same All-wise and Omnipotent Author and Lawgiver, that all created matter is under the influence of a universal and unchangeable *law* of a positive and a negative force.

Brief History of some of the more Remarkable Comets.

The word *comet* literally signifies a *hairy star;* because such bodies are generally accompanied with a nebulosity or train, which has the appearance of luminous hair. The luminous point near the center of a comet, which is most brilliant, is called the *nucleus*. The haze or nebulosity which surrounds the nucleus is called the hair, and sometimes the *envelope;* and the nucleus and hair combined constitute what is usually termed the *head* of the comet. The luminous train, extending sometimes to a great distance from the head, is called the *tail* of the comet. These bodies have occasionally appeared in the heavens in all ages. The ancients were divided in their opinions respecting them; some considering them as wandering stars; others as meteors kindled in the atmosphere of the earth, subsisting for a time, and then dissipated; and others viewed them as prodigies indicating wars, famines, inundations, or pestilences.

Aristotle, who believed that the heavens were incorruptible and unchangeable, maintained that comets were generated when they first made their appearance, and were destroyed when they ceased to be visible, and consequently that they could not be reckoned to belong to the heavenly bodies, but were only meteors or exhalations raised into the upper regions of the air, where they blazed for awhile, and disappeared when the matter of which they were formed was consumed. And as the opinions of this ancient sage had a powerful influence on the philosophers and astronomers of later times—as his assertions were frequently regarded as little short of demonstrations—few persons had the boldness and independency of mind to call in question the positions he maintained on any subject discussed in his writings.

It was not before the time of the celebrated astronomer Tycho Brahe that the nature of comets began to be a little understood, and that they were considered as moving in the planetary regions. This astronomer observed with great diligence the famous comet which appeared in 1577; and, from many accurate observations during the time of its appearance, found that it had no sensible diurnal parallax, and therefore was not only far above the limits of our atmosphere, but beyond the orbit of the moon itself. Its motions were likewise particularly observed by Hagecius, at Prague, in Bohemia, at the same time that they were observed by Tycho, at Uraniburg. These two places differ six degrees in latitude, and are nearly under the same meridian, and both measured the distance of the comet from the same star, which was in the same vertical circle with the comet; yet both observers found their distances the same, and consequently they both viewed the comet in the same point of the heavens, which could not have happened unless the comet had been in a higher region than the moon. After Tycho, Kepler had an opportunity of making observations on the comets which appeared in 1607 and 1618, and from all his observations he deduced this conclusion, "that comets move freely through the planetary orbs." From this period comets began to be more accurately observed, and to be considered as constituent parts of the solar system; and at length the illustrious Newton demonstrated that their motions are performed in long ellipses, having the sun in one of their foci.

Before proceeding to inquire into the nature and physical constitution of these bodies, I shall present the reader with a brief sketch of the history of the most remarkable comets which have appeared in modern times.

One of the most remarkable comets which have appeared in modern times is that which made its appearance toward the close of the year 1680, and which was particularly observed by most of the astronomers of Europe. This comet, according to the accounts given by the astronomers of that period, appeared to descend from the distant regions of space with a prodigious velocity, almost perpendicular to the sun, and ascended again in the same manner from that luminary with a velocity retarded as it had before been accelerated. It was observed, particularly at Paris and Greenwich, by Cassini and Flamstead, by whom it was seen in the morning from the 4th to the 25th of November, 1680, in its descent toward the sun; and after it had passed its *perihelion*,* in the evening, from the 12th of December to the 9th of March, 1681. The many exact observations made on this comet enabled Sir I. Newton to discover that so much of its orbit as could be traced by the motion of the comet, while it was visible, was, as to sense, a *parabola*, having the sun in its focus, and that it was one and the same comet that was seen all that time. This comet was remarkable for its very near approach to the sun. At its perihelion, it was not above a sixth part of the sun's diameter from its surface; that is, about 146,000 miles from the surface of that luminary, and 584,000 from its center. According to Sir Isaac Newton, the velocity of this comet when nearest the sun was 880,000 miles an hour. On taking its perihelion distance, as given by M. Pingre, Mr. Squire found, by two different calculations, that its velocity in its perihelion was no less than 1,240,000 miles an hour! This velocity was so great, that if continued, it would have carried it through 124 degrees in an hour; but its actual hourly motion during that interval, before and after it passed the perihelion, was 81 degrees, 47 minutes. At this period, the diameter of the sun, as seen from the comet, must have subtended an angle of more than a hundred degrees, which must nearly have filled its whole hemisphere.

From Dr. Halley's determination of its orbit, it appears that when in its aphelion, or greatest distance from the sun, it cannot be less than 13,000,000,000, or thirteen thousand millions, of miles distant from that luminary; that is, seven times the distance of Uranus. According to the same astronomer, this comet, in passing through its southern node, came within the length of the Sun's semi-diameter of the orbit of the Earth, that is within 440,000 miles; and he remarks, "Had the earth been then in that part of its orbit nearest that node of the comet, their mutual gravitation must have caused a change in the plane of the Earth's orbit, and in the length of our year; and if so large a body with so rapid a motion were to strike the Earth, a thing by no means impossible, the shock might reduce this beautiful frame to its original chaos." Modern observations, however, render such deductions somewhat improbable. The *period* of this comet is supposed to be about 575 years. It is conjectured that it is the same comet which appeared in 1106, in the reign of Henry I., that was seen during the consulate of Lampadius and Orestes, about the year 531, and in the forty-fourth year before Christ, in which year Julius Cæsar was murdered. Its nucleus was computed to be about ten times as large as the moon. Its tail extended over a space of seventy degrees in extent.

This is the comet to the near approach of which to the Earth Mr. Whiston attributed the universal deluge in the time of Noah. His opinion was, that the Earth, passing through the atmosphere of the comet, attracted from it a great part of the water of the flood; that the nearness of the comet raised a great tide in the subterranean waters; that this could not be done without

* The *perihelion* is that point in the orbit of any planet or comet which is nearest to the sun. It is also called the *lower apsis*. The *aphelion* is that point in the orbit which is furthest from the sun; called, also, the *higher apsis*.

making fissures or cracks in the outer crust of the Earth; that through these fissures the subterraneous waters were forced; that along with the water much slime or mud would rise, which after the subsiding of the water partly into the fissures and partly into the lower parts of the Earth to form the sea, would cover over to a considerable depth the antediluvian Earth; and thus he accounts for trees and bones of animals being found at very great depths in the Earth. The same comet, he supposed, when coming near the Earth after being heated to an immense degree in its perihelion, would be the instrumental cause of that great catastrophe, the general conflagration. Modern geological researches, however, render all such hypotheses utterly untenable.

2. Another comet which has obtained a certain degree of celebrity is that which appeared in 1682, and is usually distinguished by the name of *Halley's comet.* This comet appeared with considerable splendor, and exhibited a tail thirty degrees in length. On calculating its elements from its perihelion passage, Dr. Halley was led to conclude that it was identical with the great comets which appeared in 1456, 1531, and 1607, whose elements he had also ascertained. The intervals between these periods being about seventy-five or seventy-six years, he was led to conclude that this was the period of the revolution of the comet, and ventured to predict that it would again return about the latter part of the year 1758. As this was the first comet whose return had been predicted, when the time of its expected appearance approached astronomers became anxious to ascertain whether the attraction of the larger planets, Jupiter and Saturn, might not interfere with its orbitual motion, and prevent it from arriving at its perihelion so soon as the time predicted.

Clairaut, an eminent French mathematician, after a great many intricate and laborious calculations in reference to the subject, concluded that the attraction of Saturn would lengthen the period 100 days, and the action of Jupiter 518, making in all 618 days, by which the expected return would happen later than if no such influence had taken place; so that instead of the period being 74 years, 323 days, it ought to be 76 years, 211 days; and as the comet passed its perihelion on September 14, 1682, it ought to reach the same point on April 13, 1759. These calculations were read before the Academy of Sciences on the 14th of November, 1758; but Clairaut gave notice that, being pressed for time, he had neglected in his calculations small values, which collectively might amount to about thirty days in the seventy-six years. These predictions were accordingly verified, for the comet appeared about the end of December, 1758, and arrived at its perihelion on the 13th of March, 1759, only thirty days before the time fixed by the calculations of Clairaut, who, upon repeating the process by which he had arrived at the result, reduced this error to nineteen days. The same comet again made its appearance, according to prediction, in 1835.

3. Another remarkable comet made its appearance in 1744, which excited a considerable degree of attention. It was first seen at Lausanne, in Switzerland, December 13, 1743; from that period it increased in brightness and magnitude as it approached nearer the Sun. On the evening of January 23, 1744, it appeared exceedingly bright and distinct, and the diameter of its nucleus was nearly equal to that of Jupiter. Its tail then extended above 16 degrees from its body, and was supposed to be about 23 millions of miles in length. On the 11th of February, the nucleus, which had before been

always round, appeared oblong in the direction of the tail, and seemed divided into two parts by a black stroke in the middle. One of the parts had a sort of beard, brighter than the tail; this beard was surrounded by two unequal dark strokes, that separated the beard from the hair of the comet. These odd phenomena disappeared the next day, and nothing was seen but irregular obscure spaces, like smoke, in the middle of the tail, and the head resumed its natural form. On the 15th of February the tail was divided into two branches, the eastern about 8 degrees long, the western 24. On the 23d the tail began to be bent. It showed no tail till it was as near the Sun as the orbit of Mars, and it increased in length as it approached nearer that luminary. At its greatest length, it was computed to equal a third part of the distance of the Earth from the Sun.* This was one of the most brilliant comets that had appeared since that of 1680. Its tail was visible for a long time after its body was hid under the horizon: it extended 20 or 30 degrees above the horizon two hours before sunrise.

4. In the month of June, 1770, Messier discovered a comet, the motions of which appear to be involved in a considerable degree of mystery. The comet continued visible for a long time. Lexell ascertained, from observation, that it described an ellipse around the Sun, of which the greater axis was only three times the diameter of the Earth's orbit, which corresponds with a revolution of 5½ years. It was therefore expected that it would again frequently make its appearance; but it has never since been visible, although it made a pretty brilliant appearance in 1770. The National Institute of France, not many years ago, requested M. Burckhardt to repeat all the calculations with the utmost care; and the result of his labor has been a complete confirmation of the elements obtained by Lexell. What has become of this comet it is difficult to conjecture. Its aphelion, or greatest distance from the Sun, was reckoned to be not far beyond the orbit of Jupiter, and that it approached as near to the Earth as the Moon, and ought to have appeared twelve times since the year 1770. M. Arago attempts to solve the difficulty by affirming that its orbit was then totally different from that which it has since pursued; that its passage to the point of perihelion in 1776, when it was expected, took place by day, and before the following return the form of the orbit was so altered, that, had the comet been visible from the Earth, it would not have been recognized; that before 1767, during the whole progress of its revolutions, its shortest distance from the Sun was 199,000,000 leagues, and that after 1779, the minimum distance became 131,000,000 leagues, which was still too far removed for the comet to be perceptible from the Earth. Sir David Brewster attempts to account for its disappearance by supposing that it must have been attracted by one of the planets whose orbit it crossed, and must have imparted to it its nebulous mass; and that it is probable the comet passed near Ceres and Pallas, and imparted to them those immense atmospheres which distinguish them from all the other planets. Whether any of these opinions be tenable and sufficient to solve the difficulty, is left entirely with the reader to determine.

5. Another comet, which has engaged the particular attention of astronomers during the last twenty years, is distinguished from all preceding comets by the *shortness of its periodic revolution.* It is usually denominated *Encke's comet*, so called from Professor Encke, of Berlin, who first ascertained its

* Memoirs of the Academy of Sciences for 1744.

periodical return. It was discovered at Marseilles on the 26th November, 1818, by M. Pons, and its parabolic elements were presented to the Board of Longitude, at Paris, by M. Bouvard, on the 13th of January, 1819. It was immediately remarked, that the result of Bouvard's calculations was too similar to the elements of a comet which appeared in 1805, not to consider that and the one of 1818 as the same body; and M. Encke soon after established, by incontestable calculations, that this comet took only about 1200 days, or three years and three-tenths, to travel through the whole extent of its elliptic orbit. This was considered as a very extraordinary result, as an opinion had previously prevailed that the period of a revolution of a comet must *necessarily* be long. It now appears that this comet was first seen by Messier and Mechain in 1786; afterward by Miss Herschel, in 1795; and its subsequent returns were observed by different astronomers in 1805 and 1819, all of whom, at those periods, supposed that the four comets were four different bodies. The elements of this comet, and the short period of its revolution, are now incontrovertibly established; for its reappearance in the southern hemisphere in June, 1822, took place very nearly in the positions previously calculated. The agreement was not less remarkable in 1825; and in 1828, the third period of its announced return, it occupied the places assigned to it by Encke the year preceding. It likewise appeared in 1832, 1835, and 1838.

This comet is very small; its light is feeble; it has no tail; it is invisible to the naked eye, except in very favorable circumstances, but may be seen with a small magnifying power. It revolves in an elliptical orbit of considerable eccentricity, having an inclination to the plane of the elliptic of 13⅛ degrees. On comparing the intervals between the successive perihelion passages of this comet, a singular fact has been elicited, namely, that its periods are continually diminishing, and its mean distance from the Sun shortening by slow but regular degrees. This is supposed by M. Encke to be produced by a resistance experienced by the comet from a very rare ethereal medium pervading the regions through which it moves; since such resistance, by diminishing its actual velocity, would diminish also its centrifugal force, and thus give the Sun more power over it to draw it nearer. It is therefore the opinion of Sir J. Herschel, that "it will probably fall ultimately into the Sun, should it not first be dissipated altogether—a thing no way improbable, when the lightness of its materials is considered, and which seems authorized by the observed fact of its having been less and less conspicuous at each reappearance." The acceleration of this comet is about two days in each revolution; and the frequent opportunities of observation which will occur, in consequence of the shortness of its period, may lead to new and interesting conclusions in relation to the nature of these bodies.

6. Besides the above, another periodical comet has lately been discovered, which is distinguished by the name of *Biela's*, and sometimes *Gambart's comet*. This comet was perceived at Johannisberg on the 27th Feb., 1826, by M. Biela; and by M. Gambart, at Marseilles, ten days afterward. Gambart, without delay, calculated its parabolic elements from his own observations; and by inspecting a general table of comets, he recognized that it was not its first appearance, but that it had been already observed in 1789 and 1795. Messrs. Clausen and Gambart undertook the computation of the comet's revolution, and found, each of them nearly at the same time, that the new comet made its entire revolution round the Sun in a period of about

seven years. It was afterward found, more accurately, to be 2460 days, or nearly $6\frac{3}{4}$ years. M. Damoiseau calculated the perturbations of this comet, and predicted that it would cross the plane of the Earth's orbit on the 29th of October, 1832, *a little before midnight*, at a point about 18,480 miles within the orbit of the Earth. According to this prediction, the comet actually made its appearance in 1832 about the time now specified. Its next appearance was calculated to happen in 1839, and it was reckoned that it would arrive at its perihelion on the 23d July of that year.

The predicted appearance of this comet in 1832 seems to have produced considerable alarm, particularly in France. Some German journalists predicted that it would cross the Earth's orbit near the point at which the Earth would be at the time, and cause the destruction of our globe. Such was the degree of alarm excited on this occasion, that M. G——, a Professor in Paris, put the question to the Academy of Sciences, whether it did not feel itself bound in duty to refute, as speedily as possible, this assertion. "Popular terrors," he observed, "are productive of serious consequences. Several members of the Academy may still remember the accidents and disorders which followed a similar threat, imprudently communicated to the Academy by M. de Lalande, in May, 1773. Persons of weak mind died of fright, and women miscarried. There were not wanting people who knew too well the art of turning to their advantage the alarm inspired by the approaching comet, and *places in paradise were sold at a very high rate.* The announcement of the comet of 1832 may produce similar effects, unless the authority of the Academy apply a prompt remedy; and this salutary intervention is at this moment implored by many benevolent persons." It was supposed by some, that if any disturbing cause should delay the arrival of the comet for one month, the Earth must pass directly through its head.

In order to dispel such fears, and to illustrate the nature of these bodies, M. Arago published an excellent and popular treatise on comets in the "*Annuaire*" of 1832. He showed that the result of the calculation was, that the passage of the comet ought to proceed *a little within our orbit*, and at a distance from that curve, which is equal to *four terrestrial radii and two-thirds*, or about 37,000 miles; that on the 29th October, 1832, *a portion of the Earth's orbit* might be included within the nebulosity of the comet; but that the Earth would not arrive *at the same point* of its orbit till the morning of the 30th November, or more than a month afterward; and consequently that the Earth would be more than twenty millions of French leagues (or fifty millions of British miles) distant from the comet. He adds, that "if the comet, instead of crossing the plane of the ecliptic on the 29th October, had not arrived there till the morning of the 30th November, it would have undoubtedly mingled its atmosphere with ours, and perhaps even have struck us!" The Earth is considered in more danger, if danger there be, from this comet and that of Encke, than from any other. Encke's comet crosses the orbit of the Earth sixty times in the course of a century, and there is certainly a *possibility* that it might come into collision with the Earth; but the probability of its doing so is very small, and, besides, this comet and that of Gambart are so extremely rare, that little danger is to be apprehended, even although a contact were to take place. Gambart's is a small, insignificant comet, without a tail, or any appearance whatever of a solid nucleus, and is not distinguishable by the naked eye.

7. *The comet of* 1807. This was the first comet on which I had an oppor-

tunity of making observations. My first observation was on the evening of October the 8th, 1807, a little after sunset, when it appeared in a northwesterly direction, not far distant from Arcturus, which was then only a little above the horizon. To the naked eye it appeared somewhat like a dim nebulous star of the second magnitude, with a beam of light on one side of it. Through a telescope, its tail presented a pretty brilliant appearance, and occupied a space of considerably more than a degree in length. The coma seemed to have a roundish, but dim and undefined appearance, and appeared more indistinct as the magnifying power was increased. When viewed with an achromatic telescope of thirty-one inches focal distance, and a power of thirty, it presented a very distinct and beautiful appearance, and the nucleus, coma, and tail, nearly filled the field of view. When a power of sixty was applied, it was much more indistinct than with the former power, and in all the subsequent observations the lower power was generally preferred. In the course of five or six weeks, or about the middle of November, it disappeared to the naked eye. I traced it with the telescope, as often as the weather would permit, for two or three months after it had become invisible to the unassisted sight, and found that its apparent motion was pretty rapid, and toward the northeast. About the middle of January, 1808, at eleven P. M., it appeared in a direction northeast by north; and at this time it appeared through the telescope like a small nebulous star, or like that species of comets called *bearded* comets, having no trace of any thing similar to a tail. The last time I saw it was about the end of January, when it was still distinctly visible, like a nebulous star; but cloudy weather for nearly a fortnight prevented any further observations, and I saw it no more. On the evening in which I had the last peep of it, I detected another comet within eight or ten degrees of it, which appeared like a star of the third magnitude, and exhibited a pretty brilliant appearance through the telescope. It had no tail, like the former comet, but appeared surrounded with radiant hairs like the *glory* which painters represent around the head of our Saviour. It continued visible for several weeks; but I have not seen any particular notices of this second comet, or any special observations on it, which have been recorded by astronomers.

This comet appears to have been first noticed by Herschel and Schroeter about the 4th of October, 1807, who continued their observations upon it for several months. According to Schroeter's observations and estimates, the diameter of the nucleus of this comet was about 4,600 miles, or nearly the size of the planet Mars, and appeared to be of considerable density; the diameter of its coma, 120,000 miles, but liable at different times to variations of increase and decrease; and its rate of motion, at certain periods, 1,333,380 miles a day, or 55,557 miles an hour. Its tail was divided in a very unusual manner into two separate branches; the north side continued much brighter and better defined than the other, and was also invariably convex, while the other side was concave. But what was deemed most remarkable was the variation in length and the *coruscations* of the tail. Something like coruscation had been observed by the naked eye in the case of preceding comets, and such phenomena appear to have been confirmed by the observations of Schroeter. In less than one second, streamers shot forth to two and a half degrees in length; they as rapidly disappeared and issued out again, sometimes in portions and interrupted like our northern lights. Afterward the the tail varied both in length and breadth, and in some of the observations, the streamers shot from the whole expanded end of the tail, sometimes here, sometimes there, in an instant, two and a half degrees long, so that within a single second they must have shot out a distance of 4,600,000 miles. Their light was also sometimes whiter and clearer at the end than at the base, as is occasionally seen in the northern lights. Some have objected to the extreme rapidity of the streamers as here stated, but the fact of coruscations having been seen appears to be confirmed by the observations of this celebrated and accurate observer. The observations of Herschel on this comet differ in some respects from those of Schroeter, particularly in the estimate he makes of the size of the nucleus, which he reckons to be considerably smaller than what has been stated above.

8. The most remarkable comet which has appeared in modern times, since that of 1680, was *the comet of* 1811. About the beginning of September in that year, about eight or nine in the evening, as I was taking a random sweep with my telescope over the northwestern quarter of the heavens, an uncommon object appeared to pass rapidly across the field of view, which on examination appeared to be a splendid comet. Not having heard of the appearance of any such body at that time, I was led to imagine that I had fortunately got the first peep of this illustrious stranger; but I afterward learned from the public prints that it had been seen a day or two before by Mr. Neitch, in the neighborhood of Kelso, who appears to have been the first that observed it in this country. This comet appeared with peculiar splendor, and was visible even to the naked eye, for more than three months in succession, and excited universal attention. It afforded to astronomers more opportunities for observation of its physical aspect and constitution, and for determining the elements of its orbit, than almost any other comet that had previously appeared. The two celebrated observers, Herschel and Schroeter, made numerous and very particular observations on the phenomena and motions of this comet, which were continued every clear evening for the space of nearly five months. Some of these observations, along with the remarks and deductions connected with them, are extremely interesting to the astronomical observer; but my limits will permit only a statement of the general results.

Some of the results deduced by Schroeter are the following:—That the central globe of light, or what he calls the nucleus, was 50,000 miles in diameter, or nearly six and a half times the diameter of the Earth, which he deduced from the mean of twenty-seven measurements, which gave 1′ 49″ as the mean angular diameter of the body; that this great body was in all probability chiefly fluid, though its central parts might consist of denser substances; and that there was reason to believe that it shone with its own native light. The *coma* was extremely rarefied in comparison with the nucleus, resembling a very faint whitish light, scattered in separate portions. It was divided into two—one immediately encompassing the nucleus, the other of a more faint and grayish light, sweeping round it at a distance, and forming the double tail which the comet presented. The *train*, or *head veil*, as he terms it, swept around the nucleus, at a distance equal to its breadth, and appeared as unconnected as the ring of Saturn with its body, and which sometimes appeared darker than the open sky. The diameter of this exterior part of the head was 34′ 15″, or about 947,000 miles, which is larger than the diameter of the Sun, and which he thinks must have formed a hollow cone around the nucleus, and which he thought indicated a force of a repulsive nature residing in the nucleus. Between the 4th and 6th of December a great revolution took place; the rarefied nebulous matter, which had for three months been so unusually repelled from the nucleus on every side to a distance of about one-fifth of the diameter of the head, or 190,000 miles, was again attracted to it, affording an incontrovertible proof of physical action upon a great scale, arising doubtless from the same causes which produce the other phenomena of nature. The double tail of this comet was exceeding faint compared with the nucleus and coma. On the 23d of October it extended fully eighteen degrees, notwithstanding its oblique position, the angle at the Sun being then 61° 23′; at the Earth, 69°; and at the comet, 49° 37′. Had it been viewed at right angles, it would have subtended an angle of 36° 36′, equivalent to more than 60,000,000 of miles, which is more than half the distance from the Earth to the Sun. *Coruscations*, similar to those which appeared in the tail of the comet of 1807, were likewise perceived, particularly on October the 16th, when a small tail instantaneously appeared, then vanished, and reappeared, which was in length equal to three times the diameter of the comet's head, or 2,373,000 miles. Other displays of the same kind took place on the 7th of November and the 18th of December. These facts, of the reality of which Schroeter entertained not the least doubt, must be considered as very curious and extraordinary phenomena.

Herschel's observations nearly agree with those of Schroeter, excepting that he estimates the diameter of the nucleus as very much smaller than what is stated above. He estimates the *greatest length* of the tail, as seen on the 15th of October, to have been 100,000,000, or a hundred millions of miles, which consequently extended over a space larger than that which intervenes between the Earth and the Sun; and its *breadth*, as deduced from the observations of October the 12th, nearly fifteen millions of miles. He calculated its distance, when nearest the Earth, to be about 113 millions of miles. He concluded that the solid matter of the comet was spherical, that it shone in part by its own native light, and that it probably had a rotation round its axis. From the most accurate observations of the motion of this comet, its period of revolution has been calculated to exceed 3000 years. Bessel computes it at 3383 years; and several other astronomers conceive its period to be considerably longer, even exceeding 4000 years.

9. *Reappearance of Halley's comet in* 1835. The return of this comet was calculated by Messrs. Damoiseau and Pontecoulant; the former of whom calculated its return to the perihelion on the 4th, and the latter on the 7th of November, 1835, and it actually arrived at that point only a few days after these periods, namely, on the 16th of November. It was first seen on the continent in the month of August that year, but does not appear to have been noticed in the northern parts of Britain till more than a month afterward. Its expected reappearance excited universal attention throughout Europe. Soon after the middle of September, as I was taking a sweep with a two-feet telescope over the northeastern quarter of the heavens, near the point where I expected its appearance, I happened to fix my eye on this long-expected visitor, which appeared very small and obscure. I immediately directed an excellent three-and-a-half-feet achromatic telescope, with a diagonal eye-piece magnifying about thirty-four times, to the comet, when it was distinctly seen, and appeared of a considerable diameter, but still somewhat hazy and obscure. I afterward applied a power of forty-five, and another of ninety-five; but it was seen most distinctly with the lower power. With

ninety-five it appeared extremely obscure, and nearly of the apparent size of the moon.* There appeared at this time nothing like a tail, but the central part was much more luminous than the other portions of the comet, and presented something like the appearance of a star of the third or fourth magnitude surrounded with a haze. In some of the views I took of this object, the luminous part or nucleus appeared to be considerably nearer one side than another. At this period, and for a week or ten days afterward, the comet was altogether invisible to the naked eye. Many subsequent observations were made, and published in the provincial newspapers, but which my present limits prevent me from inserting.

After the comet became visible to the naked eye, the tail began to appear, and increased in length as it approached its perihelion, and at its utmost extent was estimated to be above thirty degrees in length. On the 13th of October, according to the observations of Arago, a luminous sector was visible in its head; on the day following, this sector had disappeared, and a more brilliant one and of greater longitudinal extent was formed in another place. This second sector was observed on the 17th, when it appeared less bright; and on the 18th its weakness had decidedly increased. The comet was concealed till the 21st, but on that day three distinct sectors were visible in the nebulosity. On the 23d all traces of these sectors had disappeared, the nucleus, which had previously been brilliant and well-defined, having become so large and diffuse that the observer could scarcely believe in the reality of such a sudden and important alteration, till he satisfied himself that the appearance was not occasioned by moisture on the glasses of his instrument. It appears, likewise, that one of these luminous fans or sectors was observed by Sir J. Herschel, at the Cape of Good Hope, after the comet had passed its perihelion. The nebulosity of this comet appears to have increased in magnitude as it approached the sun, but its changes were sometimes unaccountably rapid. On one occasion it was observed to become obscure and enlarged in the course of a few hours, though a little before its nucleus was clear and well defined. On the 11th of October, the Rev. T. W. Webb, and two other observers, observed *coruscations* in the tail. On that evening, at 7 30′, the tail was very conspicuous, in the constellation of Draconis, and evidently fluctuated, or rather coruscated in length, being occasionally short, and then stretching in the twinkling of an eye to its full extent, which was at least equal to ten degrees. Its changes were extremely similar to the kindling and fading of a very faint streamer of the Aurora Borealis.

"The influence of the ethereal medium on the motion of Halley's comet will be known after another revolution, and future astronomers will learn by the accuracy of its returns, whether it has met with any unknown cause of disturbance in its distant journey. Undiscovered planets beyond the visible boundary of our system may change its path and the period of its revolution, and thus may indirectly reveal to us their existence, and even their physical nature and orbit. The secrets of the yet more distant heavens may be disclosed to future generations by comets which penetrate still further into space, such

* In viewing comets, telescopes with large apertures and comparatively low magnifying powers should generally be used, as the faint light emitted by comets, whether it be inherent or reflected, will not permit the use of so high magnifying powers as may be applied to the planets.

as that of 1763, which, if any faith may be placed in the computation, goes nearly 43 times further from the Sun than Halley's does, and shows that the Sun's attraction is powerful enough at the distance of 144,600 millions of miles to recall the comet to its perihelion. The periods of some comets are said to be many thousand years, and even the average time of the revolution of comets generally is about a thousand years; which proves that the Sun's gravitating force extends very far. La Place estimates that the solar attraction is felt throughout a sphere whose radius is a hundred millions of times greater than the distance of the Earth from the Sun." "The orbit of Halley's comet is four times longer than it is broad; its length is about 3420 millions of miles, about 36 times the mean distance of the Earth from the Sun. At its perihelion it comes within 57 millions of miles of the Sun, and at its aphelion it is 60 times more distant. On account of this extensive range, it must experience 3600 times more light when nearest to the sun than in the most remote point of its orbit. In the one position the Sun will seem to be four times larger than he appears to us, and at the other he will not be apparently larger than a star."

The appearance of this comet, so near the time predicted by astronomers, and in positions so nearly agreeing with those which were previously calculated, is a clear proof of the astonishing accuraey which has been introduced into astronomical calculations, and of the soundness of those principles on which the astronomy of comets is founded. It likewise shows, that comets in general are *permanent* bodies connected with the solar system, and that no very considerable change in their constitution takes place while traversing the distant parts of their orbits.

From the preceding historical sketches and descriptions the reader will learn something of the *general phenomena* of comets; and I shall now briefly inquire into the opinions which have been formed respecting the

Physical Constitution of Comets.

On this subject our knowledge is very imperfect; in fact, we may be said to know little or nothing of the physical construction of those mysterious bodies, or of the nature of the substances of which they are composed. In regard to the *nebulosity* of comets, where there appears no nucleus, it has been conjectured to be composed of something analogous to globular masses of vapor, slightly condensed toward the center, and shining either by inherent light or by the reflected rays of the Sun. When there is a nucleus in the center of a comet, it seldom happens that the nebulosity extends to it with a gradually increasing intensity. On the contrary, the parts of the nebulosity near the nucleus are but slightly luminous, and seem to be extremely rarified and transparent. At some distance from their center, their shining quality is suddenly increased, so that it looks like a ring of invariable size resting in equilibrium around the center. Sometimes two, and even three of these concentric rings have been perceived separated by intervals; but what appears to be a ring must in reality be a *spherical covering*, an idea of which may be formed by imagining in our atmosphere, at three different heights, three continued layers of clouds entirely covering the globe. The matter of the nebulosity is so rare and transparent that the smallest stars may frequently be seen through it.

As to the *nucleus*, it is generally considered as the solid or densest part of the comet. The *nuclei* of comets are sometimes very similar to the disks of planets, both in form and brightness. They are generally small compared with the whole size of the comet; but in some cases they are of considerable magnitude, as we have already stated in respect to the comets of 1807 and 1811. Some suppose that the nuclei of comets are transparent, as well as their nebulosities, and allege as a proof that stars have been seen through a nucleus. Thus, Montaigne is said to have seen a star of the sixth magnitude through the nucleus of a small comet, and Olbers saw a star of the seventh magnitude, although it was covered by a comet, and without its light being rendered less powerful; but the accuracy of such observations has been called in question. On the other hand, it has been concluded that the nucleus of a comet has on several occasions eclipsed a star which was in the same line of vision. Messier, when observing the small comet of 1774, perceived a star which was eclipsed by the opaque body of a comet, or at least all the circumstances attending it led to that conclusion. On the 28th of November, 1828, at $10^h\ 30'$ P. M., M. Wartman, at Geneva, perceived a star of the eighth magnitude completely eclipsed by Encke's comet. Comets have likewise been observed to transit the disk of the Sun like dark spots. M. Gambart, of Marseilles, calculated that a comet which he had observed would pass across the Sun on the morning of the 18th of November, 1826, and both he and M. Flaucerques were successful in obtaining a sight of it during its transit. Mr. Capel Lloft, on the 6th June, 1818, at 11 A. M., saw a body passing over the sun's disk which appears to have been a comet. It was likewise seen on the same day by Mr. Acton, at $2^h\ 30'$, considerably advanced beyond the point in which it was seen at 11 A. M., and its progress over the disk seems to have exceeded that of Venus in transit. These observations seem evidently to indicate that some comets at least have nuclei composed of solid and opaque materials. From all the observations in relation to this point, collected by M. Arago, he deduces the following conclusions: 1. That there exist some comets destitute of the nucleus. 2. That there are other comets, the nuclei of which are transparent. 3. That there are also comets, which are more brilliant than the planets, the nuclei of which are probably solid and opaque.

In respect to the *tail*, or luminous train, which generally accompanies comets, it is found that it is *generally* in opposition to the Sun, or on the prolongation of the line which would join the Sun and the nucleus. But this is not always the case. Sometimes the direction of the tail has been found at right angles with this line; and in some extraordinary instances the tails of comets have been observed to point directly toward the Sun. This was the case with a comet that appeared in 1824, which for about eight days exhibited an additional luminous train in opposition to that which assumed the ordinary direction. This anomalous tail, according to Olbers, was 7° long, while the other was only 3½°, and it was bright enough to be seen with an opera-glass. In general, however, it is found that the tail inclines constantly toward the the region last quitted by the comet, as if in its progress through an ethereal medium, the matter forming it experienced more resistance than that of the nucleus. The tail is generally enlarged in proportion to its distance from the head of the comet, and in certain cases it is divided into several branches, as already noticed of the comet of 1807. Some have supposed that the divided tail is nothing more than a perspective representation of the sides of a great hollow cone; but there are certain observations which seem to prove that, in some cases, they have a separate existence as independent branches. The most remarkable instance of a divided tail was in the comet of 1744. On the 6th and 7th of March, there were six branches in the tail, each of them about 4° in breadth, and from 30° to 40° long. Their edges were pretty well defined and tolerably bright; their middle emitted but a feeble light, and the intervening spaces were as dark as the rest of the firmament. The tails of comets, as already noticed, sometimes cover an immense space in the heavens. The comet of 1680 had a tail which extended to 68°, that of 1811 to 23°, and that of 1769 to 97° in length; so that some of these tails must have reached from the zenith to the horizon. The length of the tail of the comet of 1680, estimated in miles, was 112,750,000; that of 1769, 44,000,000; and that of 1744, 8,250,000 miles. A body moving at the rate of 20 miles every hour would not pass over the space occupied by the tail of the comet of 1680 in less than 643 years. It has been supposed by some astronomers that certain changes in the appearance of the tails of comets arise from the rotation of the cometary body; as some comets have been supposed to rotate about an axis passing through the center of the tail, such as that of 1825, which was concluded, from certain appearances, to perform its rotation in 20 hours 30 minutes.

As to the nature of the immense tails of comets, their origin, or the substances of which they are composed we are entirely ignorant; and it would be wasting time to enter into any speculation on this subject as nothing could be presented to the view of the reader, but vague conjectures, gratuitous hypotheses, and unfounded theories.

Miscellaneous Remarks on Comets.

1. *Whether comets shine with their own native light, or derive their light from the Sun?*—This is a question about which there have been different opinions, and at the present moment it may be considered as still undetermined, though the probability is, that in general, they derive their light from the same source as the planets. It appears to have been the opinion of both Schroeter and Herschel, that the comet of 1811 shone by inherent light; and the rapid variations which have been observed in the brightness of the nucleus, and the coruscations of the tail, are considered by some as inexplicable on any other hypothesis. It is likewise supposed that certain phenomena, which have been observed in the case of faint and rarefied comets, tend to corroborate the same position. For example, Sir J. Herschel, on September 23, 1832, saw a small group of stars of the 16th and 17th magnitude through the comet of Biela. Though this group could have been effaced by the most trifling fog, yet they were visible through a thickness of more than 50,000 miles of cometary matter; and therefore it is supposed scarcely credible that so transparent a material, affording a free passage to the light of such minute stars, could be capable of arresting and reflecting to us the solar rays. On the other hand, it has been objected to this opinion, that comets have appeared as dark spots on the disk of the Sun; that their light exhibits traces of *polarization;* and that they have been occasionally observed to exhibit *phases*. M. Arago remarks, that "on the very day that any comet shall appear with a distinct phase, all doubts on this subject will have ceased." But it is considered doubtful whether any *decided phase* has yet been perceived, although some observers were led, from certain phenomena, to infer that something like a phase was presented to their view. It is found that all direct light constantly divides itself into two points of

the same intensity, when it traverses a crystal possessing the power of double refraction; reflected light gives, on the contrary, in certain portions of the crystal through which it is made to pass, two images of unequal intensity, provided the angle of reflection is not 90°; in other words, it is *polarized* in the act of reflection. On this principle, M. Arago pointed out a photometric method of determining whether comets borrow their light from the Sun, or are luminous in themselves. On the 23d of October, 1835, having applied his new apparatus to the observation of Halley's comet, he immediately saw two images presenting the complementary colors, one of them red, the other green. By turning the instrument half round, the red image became green, and *vice versa.* He concluded therefore that the light of the comet, at least the whole of it, is not composed of rays possessing the property of direct light, but consists of that which is *polarized* or reflected specularly: that is, of light derived from the Sun. These experiments were repeated with the same result, by three other observers in the Observatory of Paris.

2. It appears to be a remarkable fact in respect to comets, that *the real diameter of the nebulosity increases proportionably as the comet* BECOMES DISTANT *from the Sun.* Hevelius appears to have been the first who made this observation; but it seems to have been overlooked, and even an opposite position maintained. As the tails of comets increase in length as they approach their perihelia, so it was generally considered that the nebulosities followed the same law; but the observations which have lately been made on Biela's comet have confirmed the observations of Hevelius. On the 28th of October, 1828, this comet was found to be nearly three times further from the Sun than on the 24th of December, or in the proportion of 1.4617 to 0.5419, yet in October its diameter was about twenty-six times greater than in December, or in the proportion of 79.4 to 3.1; that is, its solid contents on the 28th of October were 16,800 times greater than on the 24th of December, and the *smallest* size of the comet corresponded to its *least* distance from the Sun. M. Valz, of Nimes, and Sir John Herschel have attempted to account for this circumstance on very different principles, but neither hypothesis appears to be satisfactory.

3. *Whether a comet may ever come in contact with the Earth, and produce a concussion?*—As comets move in orbits which form extremely elongated ellipses; as they move in all imaginable directions; as they traverse almost every part of the solar system in returning from the furthest verge of their excursions; as they penetrate within the interior of the planetary orbits—even within the orbit of Mercury, and cross the orbits of the Earth and the other planets, *it is not impossible* that a comet may come in contact with our globe. An apprehension of such an event produced a considerable degree of alarm on the Continent at different periods, particularly in 1773 and 1832, as formerly stated. But when we consider the immense cubical space occupied by the planetary system in which the comets move, and compare it with the small capacities of these bodies; and when we take into view certain mathematical calculations in reference to the subject, the probability of a shock from a comet is extremely small. "Let us suppose," says Arago, "a comet, of which we only know, that at its perihelion, it is nearer the Sun than we are, and that its diameter is *one-fourth* of that of the Earth, the calculation of probabilities shows that of 281,000,000 of chances there is only one unfavorable; there exists but one which can produce a collision between the two bodies. As for the *nebulosity*, in its most general dimen-

sions, the unfavorable chances will be from ten to twenty in the same number of two hundred and eighty-one millions. Admitting then, for a moment, that the comets which may strike the Earth with their nuclei would annihilate the whole human race, then the danger of death to each individual, resulting from the appearance of an *unknown* comet, would be exactly equal to the risk he would run if in an urn there was only one single white ball of a total number of 281,000,000 balls, and that his condemnation to death would be the inevitable consequence of the white ball being produced at the first drawing."

When we consider that a Wise and Almighty Ruler superintends and directs the movements of all the great bodies in the universe, and the erratic motions of comets among the rest, and that no event can befall our world without his sovereign permission and appointment, we may repose ourselves in perfect security that no catastrophe from the impulse of celestial agents shall ever take place but in unison with his will, and for the accomplishment of the plans of his universal providence. At the same time, the *possibility* of a shock from a large comet shows us that this Earth and all its inhabitants are dependent for their present existence and comforts on the will of an Almighty Agent, "in whom we live, and move, and have our being;" and that, were it conformable to his all-wise and eternal designs, he could easily disarrange the structure of our globe, and reduce its inhabitants either to misery or to complete destruction; and that, too, without altering a single physical law which now operates throughout the universe.

If we recognize the Scriptures as a revelation from God, we may rest assured that no danger from such a cause can happen to our world for ages yet to come; for there are many important predictions contained in revelation which have not yet received their accomplishment, and must be fulfilled before any fatal catastrophe can happen to our globe. It is predicted that the Jews shall be brought into the Christian church "with the fullness of the Gentiles,"—that "the idols of the nations shall be abolished,"—that "wars shall cease to the ends of the earth,"—that the kingdom of Messiah shall extend over all nations,—that "the knowledge of Jehovah shall cover the earth, and that all shall know him from the least to the greatest;" that "the earth shall yield its increase," and its desolate wastes be cultivated and inhabited,—that moral order shall prevail, and "righteousness and praise spring forth before all the nations,"—and that this happy era of the world shall continue during a lapse of ages. These events have not yet been accomplished, though at the present moment they appear either in a state of commencement or of progression; but they cannot be supposed to be fully realized till after a lapse of centuries. The believer in Divine revelation, therefore, has the fullest assurance that, whatever directions comets may take in their motions toward the center of our system, none of them shall be permitted to impinge upon our globe, or to effect its destruction, for at least a thousand years to come, or till the above and other predictions be completely accomplished.

4. Another question occurs on this subject—namely, *whether any comets have ever fallen into the sun?* It was the opinion of Sir Isaac Newton that one purpose for which comets are destined, is to recruit the Sun with fresh fuel, and repair the great consumption of his light by the streams continually emitted every way from that luminary; and that such comets as come very near the Sun in their perihelions meet every time with so much resistance

from his atmosphere as to abate their projectile force—by the constant diminution of which, the centripetal power, or gravitation toward the Sun, would be so increased as to make them fall into his body. On a similar principle, Arago supposes that the comet of 1680, which approached so near the body of the Sun, must have passed nearer to his surface at that time than at its preceding apparitions; that the decrease in the dimensions of the orbit will continue on each succeeding return to its point of perihelion; and that "*it will terminate its career by falling upon the Sun.*" But he acknowledges that, "from our ignorance of the densities of the various strata of the Sun's atmosphere, of that of the comet of 1680, and of the time of its revolution, it will be impossible to calculate after how many ages this extraordinary event is to happen;" and he likewise admits that "the annals of astronomy do not afford any reason to suppose the previous occurrence of such an event since the origin of historical record; so that we have no direct evidence that such an event has ever taken place, or that it ever will. We know too little of the physical constitution of the Sun, and of the nature of comets, to be able to assert that the falling of a comet into the Sun would actually recruit the luminous matter of which his outer surface is composed; for we have reason to believe that there is little or no analogy between the mode in which we supply our fires by means of fagots, and that by which the solar light is recruited and preserved in its pristine vigor; and besides, it is found that bodies, particularly in certain electric states, may be rendered luminous without the addition of any extraneous body to their substances.

Of the Influence of Comets on the Earth.

In former times, the appearance of comets was supposed to be the forerunner of wars, revolutions, famine, pestilence, the deaths of great men, earthquakes, inundations and other calamities. When the splendid comet of 1456 appeared, (supposed to be the same as Halley's comet,) its tail extended at one time over more than 60 degrees. Three days before its perihelion, its nucleus was as bright as a fixed star, its tail of the color of gold, and it appears to have exhibited coruscations. Pope Calixtus, believing it to be at once the sign and instrument of Divine wrath, was so frightened at its appearance that he ordered public prayers to be offered up in every town, and the bells to be tolled at the noon of each day, to warn the people to supplicate the mercy of Heaven. He at the same time excommunicated both the comet and the Turks, whose arms had lately proved victorious against the Christians, and established the custom, which still exists in Catholic countries, of ringing the church bells at noon. In modern times, certain natural effects have likewise been attributed to the influence of comets—such as tempests, hurricanes, volcanic eruptions, cold or hot seasons, overflowing of rivers, fogs, dense clouds of flies or locusts, the plague, the dysentery, the cholera, and other disorders.

Mr. T. Forster, a respectable writer on natural science, author of "Researches about Atmospherical Phenomena," &c., published in 1829 a work on the "Atmospherical Causes of Epidemic Diseases," in which he maintains that the most unhealthy periods are those during which some great comet has been seen; that the appearance of these bodies has been accompanied by earthquakes, eruptions of volcanoes, and atmospheric commotions; and that no comet has been seen during seasons of healthiness. For example, in the year 1665 a comet made its appearance, and soon after its disappearance the city of London was ravaged by the plague. In 1680, one of the most splendid comets which have been observed in modern times made its appearance. The atmospheric effect produced by its influence, according to Mr. Forster, was "a cold winter, followed by a hot and dry summer," and "meteors in Germany." As the influence of comets on our globe and its atmosphere (if such an influence exist) must have a respect to the whole Earth, and not merely to any particular portion of it, we might ask, in reference to the first example, why did not the comet of 1665 produce a similar effect in Amsterdam, Vienna, Paris and Madrid, and in the principal cities of Asia, Africa, and America? But of such effects we never had the least intimation. In respect to the second example, we are warranted to inquire, whether the cold winter was followed by a hot summer in every other climate of the Earth? whether meteors were as common in other countries as in Germany? and whether the comet produced opposite effects, at one time congealing the pools and rivers, and at another scorching the Earth with heat? If such questions cannot be satisfactorily answered, we are not warranted in attributing such effects to the influence of comets.

We err egregiously, in this as well as in many other respects, when we infer, from two contemporaneous events, that the one is either the sign or the *cause* of the other. It is on a principle of this kind that some persons are led to attribute the events to which we have alluded to the influence of comets. Because an inundation, a war, a political convulsion, or a volcanic eruption has taken place at the time of the approach of a comet to this part of our system, therefore they conclude that there must be a certain connection between such events, and that the one is the cause and the other the effect; while the two events, in point of fact, may not have the slightest relation to each other, except their casual occurrence at the same period. We might, on the same grounds, infer that the rising of the star *Sirius* along with the Sun, which announced to the Egyptians the rise of the Nile, was the *cause* of the annual overflowing of that river. Before we can identify any event with the influence of a comet, we must not confine our views to an event or two in our immediate neighborhood, but must endeavor to ascertain whether similar events or phenomena have happened *on every part of the Earth* at the same period. As comets, either large or small—either visible to the naked eye or through a telescope, make their appearance at an average almost every year, and as epidemics, political commotions, earthquakes, hurricanes, and similar events are always to be found occurring in some particular portions of the globe, we should never be at a loss for a physical cause to account for every thing that happens here below, if comets are to be supposed to have such an influence over terrestrial affairs. Whatever takes place in any country of an uncommon nature, might then be attributed to a comet which is either approaching the center of our system or receding from it.

It is remarkable that the announcement of a comet has generally been received with melancholy anticipations, and the effects attributed to its influence have uniformly been of a calamitous nature. But why should it not be the precursor of prosperous events—of peace, plenty, social tranquillity, and genial seasons—as well as of wars, famines, revolutions, cold winters, and parched summers? It seems something like a reflection on the general benevolence of the Deity to imagine that he has created such a vast number of bodies, and directed their course through every part of the planetary regions, chiefly for the purpose of "shaking from their horrid hair" wars, famine, and pestilence; for if they produce such effects upon the Earth, we might with equal reason believe that they produce similar effects on the other planets of our system as they pass along in their course toward the Sun; and this would lead us to infer that the inhabitants of all the planetary orbs are liable to the same disasters and calamities as the inhabitants of the Earth, a position which seems scarcely consistent with the boundless benevolence of the Divine mind.

But although I do not admit the conclusions and the cometary influences to which I have alluded, I am far from asserting that comets have no influence whatever on our globe or its surrounding atmosphere. The universe is one great whole, and all its parts, however remote, must be supposed to have a certain relation to one another; and they may produce an influence, however small and imperceptible, on each other at the greatest distances. The remotest star perceptible to the eye may produce a certain physical influence on our globe, though so small and insensible as to be beyond the limits of the nicest calculation; and therefore comets which sometimes approach pretty near the Earth may produce a certain sensible effect upon our globe, particularly should a portion of their immense tails at any time sweep along the higher regions of our atmosphere. But what special influence or effects they may produce on the physical economy of our terrestrial system it is impossible for us in the mean time distinctly to ascertain, from our ignorance of the constitution of those mysterious bodies, and of the substances of which they are composed. While too much has doubtless been attributed to the influence of comets, it would be verging to an opposite extreme to maintain that they can produce no effect at all on our Earth and atmosphere. We know that certain celestial bodies produce a powerful influence on our globe. The Moon, in conjunction with the solar influence, rules the ocean and perpetuates the regular returns of ebb and flow. Its light not only cheers our winter nights, but produces a variety of other influences both on the human constitution, the atmosphere, and on the productions of the earth; and there may be many effects produced by its agency with which we are as yet unacquainted. The Sun not only diffuses light over every region of the Earth for the purpose of vision, but rays or emanations invisible to our sight proceed from his body, which promote evaporation, the growth of vegetables, and the various degrees of temperature which prevail throughout the globe. These emanations are likewise found to produce certain chemical effects, to dissolve certain combinations of oxygen, and to give polarity to the magnetic needle; and many other effects of which we are ignorant may afterwards be found to proceed from those invisible irradiations. The larger planets, Jupiter and Saturn, and those which are nearest to us, as Venus and Mars, may likewise produce certain effects on our globe, both in virtue of their attractive power and of the peculiar nature of the reflected rays they transmit to the region we occupy.

We cannot therefore but conclude, that comets may exert a peculiar influence on our terrestrial system in addition to that of other celestial bodies, and different from it, particularly those whose bulk and masses are considerable, and which approach nearest to the Earth. Their light, whether native or reflected, appears to be peculiar, and the margin of their immense tails may occasionally graze our atmosphere when we are not aware of it, and may produce a peculiar effect different from that produced by the other bodies of our system; but what that special effect is has not hitherto been determined; for the mere coincidences of certain events with the appearance of comets cannot be supposed to be owing to their peculiar influence, unless such events are found uniformly to happen on the apparition of a comet, and that too throughout a great portion of the Earth. This subject is worthy of some attention; and perhaps future observers, by more accurate observations than have hitherto been made, may throw some light on an influence which on the one hand has been perhaps too rashly set aside, and on the other carried to a pitch of extravagance beyond the line of sober reason and observation.

Let it not be supposed that, in admitting that comets may have an influence on our globe, I mean to give the least countenance to foolish superstitions, or to the absurdities of astrology, since all that I would be disposed to admit in the present case is purely a *physical* influence; an influence which may exist, although we have not yet been able to discriminate its specific effects. The most eminent philosophers have been disposed to admit such an influence. Sir Isaac Newton supposed that "the atmospheres and tails of comets may supply the planets with moisture, which is continually wasting by the growing of vegetables out of water and turning into earth;" and that from the same source may be derived "the purest part of our air, which is requisite for the existence of living beings." These opinions, indeed, cannot be proved, and they are evidently untenable; but they show that that great philosopher admitted the influence of comets. M. Arago, although he scouts the vulgar idea of comets being the cause of most calamitous events, yet he admits that, "not only cometary matter may fall into our atmosphere, but that this phenomenon is of a nature to occur frequently, and may possibly produce those epidemic diseases which have been attributed to it."

A variety of questions has been started respecting cometary action and influence, beside those to which we have now alluded. It has been a question whether we ought to have recourse to the action of a comet *to account for the rigor of the climate of North America?* It is found that in the northern regions of America, the climate in the same latitude is much colder than in Europe. To account for this, Dr. Halley supposed that a comet had formerly struck the earth obliquely, and changed the position of its axis of rotation. In consequence of that event, the North Pole, which had been originally very near to Hudson's Bay, was changed to a more easterly position; but the countries which it abandoned had been so long a time and so deeply frozen, that vestiges still remain of its ancient polar rigor, and that a long series of years would be required for the solar action to impart to the northern parts of the new continent the climate of their present geographical position. But we have no proof that a comet has ever struck the earth, or that its concussion would have the effect to change the direction of the terrestrial axis. Beside, it is well known that the Asiatic coast is equally cold in the same latitudes as the Atlantic shores of North America.

It has likewise been a subject of inquiry, *whether the depression of the soil of a great part of Asia* has been produced by the shock of a comet; and *whether Siberia ever experienced a sudden change* by a similar event? This latter inquiry has been suggested by the circumstance of the bones of elephants, rhinoceroses, and other animals peculiar to the torrid zone, having been found imbedded in the strata of that country, which has led to the supposition that Siberia was, at some remote period, comprised within the tropics. But there is no proof, nor even probability, that the action of a comet was concerned in either case. It has also been supposed that the small planets, Vesta, Juno, Ceres, and Pallas, the supposed fragments of a large planet, may have been broken to pieces by the shock of a comet. The circumstance that two of these planets, Ceres and Pallas, are encompassed with an atmosphere of great density and elevation, has been brought forward as a presumptive proof of the reality of such a concussion, and that the cometary atmosphere, not being liable to destruction by the percussion, was imparted to these planets. But when we consider the very small density of comets, it appears not at all probable that even a direct concussion from such a body would have produced such an effect, although it might have caused a considerable derangement of the physical constitution of the planet. Besides, this hypothesis does not account for the remarkable fact that Vesta and Juno exhibit no traces of an atmosphere which, in consistency with the supposition, ought to have been imparted to them by the comet, as well as to Ceres and Pallas. On the whole, we have no direct or satisfactory proofs that comets have ever come in direct contact with our globe, or that they have produced any considerable derangements throughout the planetary system; and whatever specific influence they may produce on our earth and atmosphere must be deduced from future observations.

All that can be said of comets which is reliable, more than can be seen, is that they are electric bodies moving in projectiles magnetically arranged with the positive pole forward. It may be said that the Sun moves in the same manner in its orbit. All the planets have reversed poles to the Sun, and revolve on their axes surrounded by atmosphere; *while the atmosphere of a comet* constitutes its tail, through which the Sun's electric rays of light pass. This phenomena is the same as the Aurora, or northern lights, and is precisely from the same cause. Thus as magnetic bodies when approaching their nearest contact or perihelion, their motion is accelerated. This is the true law of magnetic bodies, and this constitutes their *aerial* splendor as they move through space.

The Comet of September 12th, 1858.

This comet made its appearance in the northern hemisphere about the middle of September, near and directly under the bowl of the Dipper, or Great Bear, and about twenty-eight degrees below the plane of the pole star. It had the appearance of coming in and passing round the Sun at an angle of about forty-five degrees west of and below the Sun, and went out at an angle of about forty degrees east of the Sun—as viewed from the Earth in September and October.

There were various opinions as to the size and diameter of its mass. From a close observation of this comet, it may be said that it passed its perihelion on the 9th of October. It passed one degree below Arcturus on the evening of the 7th of October, at which time it seemed to have attained its greatest brilliancy. On the 20th, at half-past six in the evening, it stood perpendicular to Venus, three and a half degrees above that planet, and eleven and a half above the horizon. At the same time it stood at an angle with its tail of forty-five degrees south-southeast from the Sun's line of the ecliptic. These few measurements prove that this comet passed a *little* outside of the line of the Earth's orbit, and west about thirty-five days before the Earth arrived at that point.

GENERAL REMARKS

ON THE

ORIGIN OF THE EARTH'S MOTION TO THE SUN.

PROBABLY the primeval order of the Earth's motion on its axis, and in its path around the Sun, was without obliquity, and consequently without change of seasons; unending summer and equal light spreading from pole to pole, and causing an undisturbed verdure and tropical fruits to exist far from the equator, both toward the north and south, where now the frigid zones forbid the existenee of vegetable life to any extent.

The history of the Earth is written in the volume of effects, which are undeniable; it may be read also in nature and revelation combined, and by reference to causes and effects may be seen the laws and the order by which and in which each mighty revolution was effected, affording indubitable evidence of the truth of the word of God, as well as of the durability of His works.

It has been supposed that that dread sentence, "Cursed is the ground for thy sake," received its fulfillment when God caused the Flood to cover the Earth, changing at the same time the Earth's orbit, and causing the obliquity of the pole to the Sun's plane and pole or axis, whereby were produced all the present phenomena of the seasons. But whether or not those who thus speculate have any foundation in truth, it is confidently asserted that there is both reason and Scripture to sustain the belief that the present inclination of the Earth's axis will be perpetual; the assurance given to Noah, that there should be summer and winter as long as the Earth endured, being supposed to be equivalent to the fiat that the Earth's axis should remain inclined. The passage referred to is found in Genesis viii. 20–22, and is as follows: "And Noah builded an altar unto the Lord, and took of every clean beast, and of every clean fowl, and offered burnt-offerings on the altar. And the Lord smelled a sweet savor; and the Lord said in his heart, I will not again curse the ground any more, for man's sake; for the imagination of man's heart is evil from his youth: neither will I again smite any more every thing living, as I have done. While the earth remaineth, seed-time and harvest, and cold and heat, and summer and winter, and day and night shall not cease."

The Mosaic account of the partial destruction of the Earth by the Deluge has been by some considered to be fully sustained by the organic remains of past ages, both vegetable and animal, which exist in abundance in a fossil or petrified state, proving incontestably that at some long past era most wonderful changes took place in the physical condition of the Earth. Not only does the presence of marine fossil shells, of species both known and unknown, at the tops of high mountains, and in other localities far remote from the sea

—as for instance in the neighborhood of Cincinnati—prove that many parts of the Earth were once far beneath the surface of the ocean, but there is much evidence to show that our planet has undergone a very great change in temperature—such as whole forests of tropical trees found beneath the Earth's surface in northern regions, and the remains of elephants in Siberia, in such quantities that the ivory turners of St. Petersburg use for their purposes chiefly what is so found. In the same inhospitable region are also found the gigantic remains of an extinct species of elephant, one of which was discovered a few years ago in a condition so perfect that even the hide and hair were undecayed, it having been imbedded in the ice probably for countless ages in that climate of perpetual winter. These facts show that the climate of Siberia must at one time have been such as belongs to those countries in which the elephant is found at the present day; that is to say, it must have had the climate of Africa or India,—from which it must be inferred either that the regions now polar were once equatorial, or that the temperature of the Earth at large has been lowered from a degree in which the heat of the polar regions was equal to that of the equatorial regions now, and that the heat of the equatorial regions was so great that they could not have been habitable by man as he is at present constituted.

But though there can be only one opinion relative to the fact of the submersion of the Earth at some remote period beneath the waters of an overwhelming flood, some of the best of men have doubted whether the Noachian Deluge is that to which the great changes which the Earth has undergone must be referred. But, at least, the possibility of that event must be admitted. The vastness of space teems with the traveling messengers of God, which we call comets; one of these may have visited the Earth, causing it to leave its wonted plane, changing the direction of its axis, causing the ocean to rush over the continent—when literally the "fountains of the great deep were broken up"—and sweeping to destruction every living thing.

But it must be admitted that the weight of evidence is in favor of a theory which refers the vast changes the surface of the Earth has undergone to other and much longer continued action than that of the Noachian Deluge, which it is contended was only partial in extent, and not lasting a single year; while there is a vast accumulation of geological facts tending to show that many successive submersions and upheavals of the Earth's surface, and a lapse of thousands of years, were necessary to produce the enormous masses of fossiliferous rocks that are found in all parts of the world. There is every reason, too, to believe that these changes took place chiefly before the existence of man upon the Earth, though evidence is not wanting which tends to show that since the appearance of man geological changes have taken place to some extent.

In examining these evidences, it may be stated, in a general way, that the ages of the different strata of rock indicate the age of the organic remains imbedded in them; and that in the strata of the present period, there are found, besides the existing races, many extinct species, including animals of an enormous size. The organic remains of man, with the monuments of his arts, are also found buried in this last common grave.

The remains of man, and old pottery, with other monuments of his arts, have been found buried in deep caves of rock, both in Europe and this country; and his remains have also been found, buried with his rude stone house, in the peat bogs of Ireland, clad in skins, and in a perfect state of preservation.

About the year 1787, some workmen were occupied near Aix, in Provence, France, in quarrying stone for the rebuilding, upon a vast scale, of the Palace of Justice. The stone was a limestone of a deep gray, and of that kind which is tender when it comes out of the quarry, but which hardens by exposure to the air. The strata were separated by a bed of sand mixed with clay, more or less calcareous. The first which were wrought presented no appearance of any foreign bodies; but after the workmen had removed the first ten beds, they were astonished, when taking away the eleventh, to find its inferior surface, at the depth of 40 or 50 feet, covered with shells. The stone of this bed having been removed, as they were taking away a stratum of argillaceous sand, which separated the eleventh bed from the twelfth, they found stumps of columns and pieces of stone half wrought, which were exactly similar to that of the quarry; they found, moreover, some coins, handles of hammers, and other tools, or fragments of tools, in wood. But that which principally commanded their attention, was a board about one inch thick and seven or eight feet long. It was broken into many pieces, of which none were missing, and it was possible to join them again one to another, and to restore to the board or plane its original form, which was that of the boards used by masons and quarrymen; it was worn in the same manner, rounded and waving upon the edges. The stones which were completely or partly wrought were not at all changed in their nature, but the fragments of the board, and the instruments and the pieces of instruments of wood, had been changed into agates, which were very fine and agreeably colored. Here, then, were traces of a work executed by the hand of man, placed at the depth of fifty feet, and covered with eleven beds of compact limestone: every thing tended to prove that this work had been executed upon the spot where the traces existed. The presence of man had preceded the formation of this stone, and that very considerably, since he was already arrived at such a degree of civilization that the arts were known to him, and that he wrought the stone and formed the columns out of it.

The forests which covered the dry land at that period, many of which are now standing, and from which the board and handles of the tools of the workmen were made, are found buried all over Europe, beneath the surface of the present period.

In all countries, in digging to certain depths, and in mining, the remains of fishes, vegetables, quadrupeds, and birds, are found in the soil, or imbedded in the rocks, except in those of primitive antiquity. The general regularity with which those that are marine are laid at one level, and those which are products of the land are laid at another, and in the alternations of these marine and land products, lead to the conclusion that the sea has repeatedly covered the land for long periods of time, and that the land has, at intermediate periods been dry. And the discoveries in the quarries near Aix, are one of the many evidences which lead irresistibly to such conclusions; for there must have been a long period of submersion, in which that country was covered with the ocean, between those periods in which the workmen at this quarry were succeeded by the workmen of another.

We have on this continent the same evidences of a corresponding period of submersion since the creation of man. Immense forests are found buried here, portions of which are now standing like those found in Europe.

A diminutive iron horse-shoe was dug up, at the depth of twenty-five feet below the surface, in graduating a street in Cincinnati. It was smaller than the kind of shoe required for the smallest kind of asses. A number of nails were in it, and the erosion by rust was such as might have been expected from the oxydation of 500 years.

In digging a well in Cincinnati, the workmen came to the top of a stump a foot and a half in diameter, at the distance of 94 feet from the surface, on the top of which was found an iron wedge; and below this, near the roots of the stump, which had been evidently cut with an axe, a small silver coin.

In blasting the thick and solid limestone rock, at a distance of 14 feet from the surface, when the workmen were constructing the steamboat canal at Louisville, Ky., they came to a brick hearth, covered in part with charcoal, and what appeared to be old ashes, the remains of the last fire built upon it by the hand of man.

In digging wells all over the valleys of the Ohio and Mississippi rivers, as well as their tributaries, it is necessary to sink them through beds of many different kinds of earth and sometimes of lime rock, to the ancient surface of the earth, on which are constantly found old logs, stumps, and sometimes standing trees, and the relics of human art. The soil on the old surface of the earth thus found, and once cultivated by man, which the farmers now call the old or ancient soil, is generally a rich blue clay.

Little is known in regard to the changes in this hemisphere beyond the generally acknowledged fact that the ocean is rising in the low latitudes, or along the coasts from New York to the Mississippi. Among the evidences of the rise of the ocean, and of its encroachments upon the land along these coasts, is the submergence of the old walls of some of the houses erected by Captain Smith and his contemporaries, at Jamestown, Va., in 1600, latitude 37°, which are now some distance from the shore in James River, and the old town itself has long since become an island, from the encroachment of the water on the back part of it. The amount of the rise of the water there in 230 years, is variously estimated at from five to seven feet, which has made it necessary to erect a bridge from the island to the main-land.

At St. Augustine, Florida, latitude 26° 46′ 30″, an old dock and an old grave-yard have become submerged, and the government is now engaged in erecting a wall to protect the town from the further encroachment of the ocean; which again corresponds with this theory, or that of the ancient eastern nations.

Some modern geologists, among whom is Mr. Lyell, have created in their imaginations the necessity of a new theory to account for the elevation of the land above the level of the sea, on the gratuitous assumption that the ocean "cannot be lowered in one place without a general subsidence throughout its whole extent," and attempt to account for the alternate changes in the elevation of the land above the level of the ocean by volcanic convulsions. Their hypothesis is, however, based upon local causes, which are neither constant nor uniform in their action; whereas the effect produced requires a general cause in constant operation. Aware of this objection, they acknowledge they "cannot, in all cases, understand the possibility of the elevation of the land out of the sea by the mere effect of local convulsive movements."

Convex and Concave Belts of the Earth.

The Earth has three great convex and two concave belts, and is flattened at the poles, so that the equatorial diameter is supposed to be about thirty-six miles greater than the polar diameter, while the fact is that the equatorial diameter is at least two hundred and fifty miles greater. This configuration of the earth is the result of natural or physical and mechanical laws—the centrifugal and centripetal forces operating on the Earth revolving on her axis together with the atmospheric pressure and the universal law of matter and of space—the positive and negative forces or law of attraction. These forces thus combined cause an elongated equator or great ridge; this being convex causes a sag, or concave, which concavity at its equilibrium, or at a distance proportionate to the diameter of a sphere of the Earth's magnitude, again causes another convexity and a flattened pole; and thus is produced by a combination of the above laws and forces, an undulated or corrugated surface to the Earth. If proof were required to establish this theory, it would be afforded by a geographical view of the gulfs and rivers which head on a line of about forty-three to forty-five degrees north latitude, and discharge each way, north and south, into the great gulfs at about thirty-three to thirty-five degrees north latitude—forty-three degrees north being about the center of the northern convex belt. See the line of thirty-five degrees north—the line of gulfs and bays from San Francisco to Mexico, and the Mediterranean and Red Seas. This great northern ridge is a winter barrier to protect commerce between the poles and equator.

All steam and wind crafts bound to England or France should cross the Atlantic south of the forty-fifth degree of north latitude, in winter, through the concave zone.

This corrugated form of the Earth's surface—no doubt causing an unequal temperature of the sea-water—has probably much to do with the winds and calms of the atmosphere, and the tides and currents of the ocean. So long as the atmosphere is unchanged in density, so long it remains at rest; but whatever tends to change this, operates to set it in motion; so also with the ocean—heat and cold, operating both by evaporation and by their contractile and expansive influence, produce motion in the waters of the sea. Thus, both the atmosphere and ocean are kept in perpetual motion, constantly seeking an equilibrium, but finding none. Thus are accounted for the Gulf Stream and under-currents from ocean to ocean, as well as the existence of the winds both regular and otherwise. In both the ocean and the atmosphere, when the lower strata become heated from subterranean fires, they begin to rise, and in doing so, displace the strata above them, and thus contribute to that agitation of wind and wave which it would seem is destined never to cease.

MISCELLANEOUS.

The Waters "Above the Firmament."

There are some passages in Scripture which—to those who accept the revealed word of God as not only their guide in matters of religious belief, but as a sufficient source of scientific knowledge—tend to establish the theory that at some vast and unknown distance in the immeasurable regions of space, there exists a boundless concave of water. To such persons there seems nothing incredible or impossible in the idea that creative power should suspend "shoreless seas" in the remote ethereal regions, any more than that the same power should have formed and set bounds to the never-resting oceans beneath. It must be admitted, that a literal acceptation of the following passages makes it almost necessary to adopt some such theory. They are sufficient, at any rate, to claim for the question a respectful consideration.

"And God said, Let there be a firmament in the midst of the waters: and let it divide the waters from the waters. And God made the firmament, and divided the waters which were under the firmament from the waters which were above the firmament: and it was so. And God called the firmament heaven: and the evening and the morning were the second day." (Genesis i. 6–8.)

"Praise Him, ye heavens of heavens, and ye waters that be above the heavens." (Psalm cxlviii. 4.)

"In them hath he set a tabernacle for the sun . . . . his going forth is from the end of the heaven, and his circuit unto the end of it." (Psalm xix. 4, 6.)

Guided by the teachings of science, it would not be difficult for the literal reader of Scripture to suppose that our solar system moves within a vast hollow sphere of frozen waters, on the interior surface of which are reflected from innumerable points the rays of the Sun, and that thus are accounted for the innumerable fixed stars. In short, that the heavens are but an immense mirror, in which our Sun and his planets are reflected from icy fields and mountain peaks; that there are no other suns or solar systems—a doctrine which, it is worthy of remark, has not only the apparent testimony of Holy Writ, but is in accordance with a physical law of the elements.

Causes which have Produced a Change of Climate.

With respect to the cause or causes which have effected so great a change in the temperature of the Earth's surface, there are a great variety of opinions.

Burnet, as stated in the abstract we have given of his theory, accounted for this change by supposing that the Earth's axis took a new and different position at the time of Noah's flood; but astronomy has shown the improbability of any such change in position.

Most writers who admit a deterioration of climate, suppose with Burnet that the change was sudden, and that it took place about the period of the deluge. Some, however, and among them Mr. Lyell, believe it to have been gradual, occupying thousands of years, and to have been caused by the changes which have taken place in the relative positions of the sea and land. But in the first place, no such changes as this author supposes are proved to have happened with respect to the sea and land; nor second, had such changes been proved, is it at all probable such local causes could have been adequate to effect a change so material and universal.

Sir John F. W. Herschel has recently made some calculations and inquiries, with the view of ascertaining whether there existed any astronomical causes which might account for the difference between the present and ancient heat of the Earth's surface. "Geometers," he says, "have demonstrated the absolute invariability of the mean distance of the Earth from the Sun; whence it would at first seem to follow, that the mean annual supply of light and heat derived from that luminary would be alike invariable; but a closer consideration of the subject will show that this would not be a legitimate conclusion, but that, on the contrary, the *mean* amount of solar radiation is dependent on the eccentricity of the Earth's orbit, and therefore liable to variations.

"Now the eccentricity of the Earth's orbit," he continues, "is actually diminishing, and has been so for ages beyond the records of history. In consequence, the ellipsis is in a state of approach to a circle, and the annual average of solar heat radiated to the Earth is actually on the *decrease*. But whether this diminution of radiated heat is sufficient to account for the refrigeration of climate, which geological facts appear to prove, is a question which has not been decided."

Allowing that the Earth's orbit should become a perfect circle, we are at a loss to see how the mean annual radiation should thereby be diminished. It is the opinion of M. Arago, that the mean amount of solar radiation can never be materially affected by the irregularities of the Earth's annual motion.

It would appear, therefore, that we cannot look to astronomy with much confidence for a solution of the problem in question.

A recent and highly respectable author, Dr. Ure, of Glasgow, believes that the original heat of the Earth was dissipated in consequence of the evaporation of the waters of the deluge.

The effects of evaporation, together with the absence of a large heating surface, is strikingly illustrated in the temperate climate of St. Helena. This island, though less than eighteen degrees from the equator, and on a parallel with the burning plains of continental Africa, enjoys one of the most comfortable and salubrious climates on the Earth. At Jamestown, the thermometer, in the warmest season, seldom rises above 80°. In the country the climate is still more mild, the thermometer in some seasons never rising higher than 72°. At Jamestown, the average temperature during the year is from 66° to 78°, the heat at this place being concentrated by the high rocks which rise above the town. At Plantation House, the average heat is only from 61° to 73°, and at Longwood, the last residence of Napoleon, from 56° to 68°.

The island of Sumatra, though directly under the equinox, presents a similar exemption from the excessive heats with which the interior of continents situated on the same parallel are oppressed. The heat at this island seldom rises higher than 85° at any season, while at Bengal, which is situated in 22° north latitude, it is often above 100°.

It is at a distance from the sea, and where the surface is dry, that the greatest accumulation of heat takes place. Mungo Park relates, that in some districts in Africa the ground became so hot by the action of the Sun, that even the negroes, though accustomed to that ardent climate, could not bear to touch it with their naked feet; and that he could not hold forth his hand against a current of air which entered the crevices of his hut, without feeling acute pain from its scorching effects.

Dr. Ure supposes that a portion of the antediluvian land is now covered by the ocean, and that the heating surface, or dry land on the Earth, was twice as extensive before the deluge as it is now, and consequently, as a whole, that its heating effects were doubled.

We cannot follow Dr. Ure through the detail of facts and arguments which he has brought forward on this subject; but after many additional statements to those we have given, he concludes, "that the facts and observations just detailed, seem adequate to prove that the events of the deluge involved such a change in the terraqueous constitution, as rendered the surface of the globe much colder and moister than it had previously been."

The great and sudden fall of temperature which the Earth suffered at a former time, and which is supposed to have taken place at the period of the deluge, is indicated by the situation and number of fossil bones, belonging to species known to inhabit hot climates, found in northern latitudes.

"The almost incredible number of bones of fossil elephants," says Dr. Ure, "found in northern Siberia, which betray no marks of having been rolled or transported from a distance, attest the existence on its plains of huge herbivorous animals at that distant epoch. These demonstrate that a vigorous vegetation clothed countries now covered with frost a great part of the year, where, even in summer, sterilizing cold and humidity perpetually reign, and where, at present, the reindeer can hardly pick up from beneath the snow its scanty mouthful of moss."

Not only the bones of elephants, but those of the rhinoceros, the mastodon, and hippopotamus, are found in Siberia. All these animals living on vegetables, and, from their size, requiring large quantities for their sustenance, it would seem impossible, as we have before stated, that, in the present state of the climate, there should have grown a sufficient quantity of nourishment for the support of these animals.

That these animals died where they had lived, and where their remains are now found, is proved by the circumstances that their skeletons are entire, and that their bones show no scratches, or other marks of transportation or friction. That these bones have not lain for a long period in a hot climate, is proved by their state of preservation—many of the elephants' tusks being perfectly sound, and making the best of ivory, for which purpose vast numbers have been dug up and sold. The change of climate must therefore have taken place at the deaths of these animals, or soon after.

That these animals died suddenly, and remained in a cold climate after death—at least some of them—is proved by the circumstance that the body of an elephant was found on the bank of the river Lena, in 1803. It was frozen in the ice, a large proportion of the flesh being still preserved, and serving as food for the white bears and dogs. Now, since there is no reason to believe that this animal could have lived in a cold climate, and as there is every reason to suppose that he died where his remains were found, perhaps the nature of such a case could not admit of stronger evidence, that there happened a great and sudden change from heat to cold in that country, and that this took place at the time when this animal perished, or soon after.

If it is certain that this animal could not have lived in a cold climate, and equally so that his body could not have been preserved more than a few days in a hot one, the conclusion is inevitable, that the climate must have changed at the time of his death, or immediately afterward.

The opinion of Baron Cuvier entirely coincides with what here seems to be proved. "Every hypothesis," says he, "of a gradual cooling of the earth, or a slow variation in either the inclination or position of the axis of the globe, is inadmissible."

There are many reasons for believing that the animals whose remains are thus found were destroyed at the time of the general deluge, and also that their bodies were not transported to any considerable distance by that catastrophe. Their bones are found on plains and the sides of valleys, where we should suppose their bodies would have been left by the retiring waters; and in many instances they have been found covered by sand or gravel, such as are considered diluvial deposits, and under such circumstances, as to make it improbable that any ordinary flood would have produced similar effects.

On reviewing the facts and circumstances above stated, it is thought that we may fairly come to the following conclusions:

First. That the climate of Siberia was once similar to that of the tropics of the present day.

Second. That at the epoch of the deluge, the climate of Siberia suffered a sudden and material change in its temperature, and that it then became similar to what it is now.

Third. That the deluge was the most probable cause of the destruction of several ancient races of quadrupeds, which inhabited that country anterior to the flood, and among which were the elephant and rhinoceros, the bones of which still exist there. And

Fourth. That the most probable cause of the sudden change of climate in Siberia, and of the decrease of the superficial temperature of the Earth generally, was the cold produced by the evaporation of the waters of the deluge.

It will be readily seen by the inserted matter or opinions of the past ages, that reason, without a proper respect to the laws of the universe or the law of matter—which is also the cause of form and motion—that facts and reason are both stubborn things, not disposed to yield the point. But as facts forever stand secure, reason learns to go back and investigate. It is therefore self-evident, that the theory of the universal *polarity* of matter and of space were not known in the days of Burnet, Dr. Ure, Baron Cuvier, Sir John F. W. Herschel, Kepler, and a host of ancients. The polar heavens, the milky-way—vast concave zone of the heavens, and heaven of heavens, and the waters above the heavens, are spoken of in the Psalms. Those worthies reasoned well, but without law. The evidence by the law of matter is confirmed both in nature and revelation. St. Paul, in ROM. i. 20, said: "The invisible things of God from the creation of the world are clearly seen, being understood by the things that are made." Now, had proper care and respect been paid to the Scriptures by those who reasoned on the subject of created matter, they would not have been confused at the innumerable changes of matter and of climate. Every step that nature has taken, has been in perfect conformity to the laws of matter and of space.

The immortal *Newton* saw the whole volume of effects, and was so overawed by these, that the great cause or law which produced these effects to him was a mystery. Had Newton known the physical law of a comet, he would have set the world on fire; in the eye of the age in which he lived. Sir Isaac Newton would have indorsed the idea of Burnet, that the deluge was caused by the attraction of a comet, and would have confirmed it from natural law and revelation.

The law of a positive and negative force, or, in other words, atmospheric electricity—called atmospheric pressure—has not been properly applied in philosophy, as may be seen by the growth and trunk of a tree being round. To some, the cause of *all* this is a mystery, as is also the formation of shot passing through space; as the melted lead leaves the fine screen at the top of the tower, the simple law of equal pressure of the atmosphere on all sides causes the spherical form. Here, then, may be seen the upward tendency by attraction and the tenacity of *atmospheric* electricity, that its equal pressure on all sides causes the circumference to be round.

The Comet, and the Law of a Comet.

The Sun is the great magnetic center of the universe of matter. All the heavenly bodies evidence the theory of the above in relation to their polarity; and from the fact of the phenomena of the precession of the equinoxes, or the constant change of their nodes, prove the magnetic theory of the solar system and the still more important truth of the Sun's motion in the heavens and the vastness of its orbit. The time of one revolution of the Sun on its axis being over twenty-five days ten hours, and in its orbit not less than 25,858 years. It must and will be conceded that the Comets come in to the Sun positively and go out negatively; and as those heavenly messengers perform their revolutions to and from the Sun, the law of God in the physical world is made to appear. On this theory is based the great fact of the creation of matter; not one jot or tittle can pass out of the power of this wonderful law. All animate beings derive their physical action, and all bodies their motion from this law. Inanimate matter is held by its negative and positive affinity or its polarity, particle to particle.

Not a seed germinates in the soil, or a drop of dew falls from heaven to moisten the earth without this law. All that comes down is first attracted upward, and falls by the same law as its bulk increases. Water possesses a magnetic property of its own, its composition being oxygen and hydrogen. Thus move on by unchangeable law all the created material universe of *God.*

Beauty as a Law.

Beauty is under the law of four cardinal heads, viz.: Form, Motion, Color, and Sound. From these emanate *all* that is beautiful in time and sense. Both the animal and vegetable kingdom prove the above. All the attributes of beauty are concentrated in woman; that most exquisite combination of form, motion, color and sound—the person of a just-balanced woman —the mother of us all, and the angel to man.

The cardinal laws of the mind are governed by the four cardinal senses of the body. These are paraphrased in Ecclesiastes xii. 6:—"Or ever the silver cord be loosed, or the golden bowl be broken, or the pitcher be broken at the fountain, or the wheel broken at the cistern."

In this noted and memorable essay is described, in most beautiful language, the dissolution of the eye, the ear, the taste and feeling of man in death.

DIVINE AGENCY.

At the funeral obsequies of the Hon. John C. Calhoun, M. C., who died March 31st, 1850, the speaker selected the 6th and 7th verses of the lxxxii. Psalm, as adapted to the character of this eminent American statesman and scholar; viz., "I have said ye are gods; and all of you are children of the Most High. But ye shall die like men, and fall like one of the princes." Here the psalmist intimates or indorses this sentiment, "That man is divine in his origin, and eternal in his duration."

But more recently I was struck with the impressive address of the present Emperor Alexander, of Russia, at his Coronation, when he said:—"Gentlemen, and House of Lords,—It has pleased God to call the Emperor, my father, to eternal life." This most profound sentiment of this young Christian monarch, will forever secure to him the respect due to such distinguished talent, seen in his choice of words and reverence for his father and for God. For God hath said, "By me kings reign and princes decree justice; by me princes rule and nobles, *even* all the judges of the earth." God's eternal purposes of life and destiny of men and nations are clearly *seen* or revealed.

REMARKS ON THE PLATES ACCOMPANYING THIS WORK.

THE object of the preceding compend is to illustrate first principles in astronomy, a true knowledge of which, and of the Earth's motion on her axis and in her orbit, is almost indispensable to a correct method of finding a ship's latitude or longitude. To perfect this knowledge, and in order to simplify this subject as much as possible, I have introduced a series of plates or cards, relating to both astronomy and navigation, in which the Sun and its declination, the Moon and its changes, and the motions of the Earth, each and all, from an astronomical, nautical, and geographical point of view, are so far explained that the practical part of navigation is made extremely simple, and a mistake made almost impossible in finding the latitude or longitude on whatever part of the surface of the globe the navigator may be.

On an inspection of these plates, it will be seen that the eclipses for the years 1859, 1860, and 1861 are laid down in a new form or configuration, as is also the transit of Mercury on the 11th of November, 1861. In the plate illustrating this transit, the Earth will be seen to have passed the autumnal equinox, and will appear in the Sun's southern hemisphere, south of the Sun's equator, 17° 44′ 43″; the planet Mercury will be seen in its winter solstice, and in its return to a *node* with the Sun, or an equinox. The transit over the Sun's disk will be visible to that part of the Earth where the Sun can be seen. At Greenwich, it will be visible at about eight o'clock in the morning (20 h. 6 m.) Though the transit of Mercury takes place every eighty-eight days through all time, the position of the Earth forbids our seeing it except at much longer intervals.

The process of finding a ship's latitude is fully worked out and explained on another of these cards; on which, at the same time, are exhibited the various changes and declinations for a solar year.

The plate intended to illustrate the method of ascertaining longitude by chronometer time will be found sufficient to give a true idea of the motions of the earth on her axis, and the rate of motion per hour, minute, and for every fifteen seconds. This motion of the Earth causes the apparent motion of all the heavenly bodies in a solar day.

Another plate exhibits the Moon in its changes; on which, also, the planets Mars, Jupiter, and Saturn are made to appear, for the purpose of showing their meridian passages, and their distances east and west of the Moon for lunar observations. This card also refers the navigator to the north polar star as an object of confidence in nautical science and practice; as it is one of the safest objects in space for finding latitude by altitude, if it be measured where it stands, without horizon or zenith being forced.

The altimeter measures the altitude of all bodies where it finds them, and gives the zenith distance at the same time. The day is coming when the accuracy of this instrument, in finding correct altitudes, will give it the precedence of all others.

The axis of the Earth is not supposed to be in an absolutely perfect line with the polar star, yet the Earth moves in her orbit from her summer solstice on the east side of the Sun to her winter solstice on the west side, one hundred and eighty millions of miles, without producing any perceptible parallax—a fact from which may be inferred its enormous distance as well as that of all the fixed stars.

The polar star is always on the meridian, and all surrounding objects make their meridian passages above or below it, so that, if these passages were recorded accurately, they would furnish to the navigator the best method for finding longitude.

The axis motion of the earth will detect an error of less than thirty seconds with a proper instrument for this purpose.

The card or engraving relating to longitude will require a little attention. At first sight it will appear simple, but by taking up each idea or position separately this device will be found useful and interesting. This table shows the method of taking lunar observations and the distance of each planet from the Moon. It is practically operated by turning the wheel representing the Earth's motions on her axis, the hour, half-hour, and quarter-hour lines, degrees, &c. This operation with the ship-master soon becomes perfectly easy and natural. By this wheel any place on the globe may be brought to the Sun's meridian by the aid of a chronometer with the time of Greenwich. This time will be found slow by traveling west, so that when Greenwich noon is at New York city, the Sun will pass the meridian at four hours and fifty-six minutes P. M.; this will show 74° west longitude from Greenwich. In like manner we may travel east or west with the correct time of any other place.

The meridian passage of the Sun in the place of the observer gives the longitude either east or west, the rate of motion of the earth on her axis being regular and reliable to a second of time in a solar year.

Thus, by this simple method of time and motion, the navigator can tell his precise locality, and his distance from London, St. Petersburg, San Francisco, or Canton in China. East or west 180° brings him under Greenwich, if he is in latitude 51° north. This is mentioned merely as an illustration to the student or new beginner, who, by the study of this simple card, may come to understand the whole subject of longitude.

The author hopes to be able, by close application, to introduce a better method of finding longitude by meridian passages of the fixed stars, which are alluded to in the card. He is confident that an accuracy within 30″ may be attained by this rule, when carried out and tabled, or properly recorded.

Plate V., on local attraction, exhibits the action of the magnetic needle, when brought under the forces of atmospheric electricity, which is perpendicular to the geocentric line of the Earth's equator, on all sides of the earth, from pole to pole. The sides of an iron ship have the power of a strong battery; the iron being made to stand perpendicular, becomes a positive and a negative force in proportion to its mass. The upper end of a bar or of a smoke-pipe becomes a negative pole, and, as can be clearly demonstrated, attracts the north pole of the compass, as seen in the engraving. The ship-master will readily see the necessity of fully testing the liability of his compass to vary under quarter headings. North and south headings generally give a correct course. The compass is the most important instrument in the ship; it is, therefore, a matter of the first consideration to the navigator that he should have a good one. Probably the best is the "Improved Compass," invented by Hall Colby. This compass has proved its superior force as a binnacle compass, and being constructed with duplicate polar-line needles, as shown on the left of the engraving, the card has less oscillation and more directive force—its poles also being concentric, and there being four polar points in the line of two oscillating polar-line needles.

The following testimonials as to the superiority of this compass make comment unnecessary:

I certify that I have used the Improved Patent Compass, invented by Hall Colby, and find it a superior Marine Binnacle Compass, being accurate in calm weather, giving the ship's heading, and more steady in storms and rough seas than any Compass I have ever seen. I can recommend this Compass to all ship-owners.

Jacob Lokman, Sandy Hook and New York Pilot.

I certify that in the month of March, 1847, by request of myself, Mr. Hall Colby put on board the U. S. Iron Steamer "Scourge," three of his patent Marine Compasses, and by these Compasses I cruised the Mexican coast, in the late war with Mexico, to my perfect satisfaction, without any artificial arrangement of Magnets. These Compasses gave my courses correctly, under the most severe trial of local attractive properties of the brig. I can safely recommend these Compasses to be superior to the common Compass, being quick in their directive force, and superior as a heavy weather and storm Compass.

C. G. Hunter, Lt. Com'dr., U. S. Navy.

New York, April 12, 1847.

Ship "Kensington:" I certify that the Compasses have been irregular and inaccurate, differing from each other, in the wheel-house half a point, and binnacle outside one point and a half. Mr. H. Colby has furnished me with two of his improved Compasses for the wheel-house, which perfectly agree with each other, and has pointed out the causes of variation and local attraction, to our perfect satisfaction, on the subject of electricity and magnetic influences. I recommend all interested in sea-faring to see Mr. Colby on this subject, and his Compass. C. H. Christianson.

U. S. Surveying Steamer "Corwin,"
New York, January 25, 1854.

I have used one of Mr. Hall Colby's Patent Improved Mariner's Compasses, for two years, on board of two U. S. vessels under my command, and have found it more perfect than any Mariner's Compass I have seen, being more steady and less affected by local attraction. I prefer it to any I have yet used. T. Augs. Craven, Lt. Com'dr.

U. S. Steamer "Princeton,"
Navy Yard, New York, May 9, 1854.

This is to certify, that there has been in use, on board of this ship, H. Colby's Mariner's Compass, and that we consider it a superior instrument, vibrating less in a seaway than the ordinary Compass, and can with confidence recommend it to general use.

Henry Eagle, Commander.
William W. Low, Act'g Master.

New York, November 13, 1855.

Mr. Hall Colby: *My Dear Sir*—In April, 1853, you furnished me with one of your Patent Marine Compasses, which was placed in use in the binnacle of our ship, and to the best of my belief, the "Macedonian" was steered and navigated by that Compass entirely, during the outward passage to the East Indies, touching at Madeira, Canaries, Prince's Island, St. Helena, and at Anger Point. I noticed myself, and recollect the master of the ship frequently remarking, its great accuracy and its superiority over the other Compass which stood in another binnacle. Your obedient servant,

L. R. Avery, late 1st Lt. of U. S. Ship "Macedonian."

Hall Colby, Esq.: *Dear Sir*—Having had your "Binnacle Compass" twelve months in constant use, it gives me pleasure to say, that I consider it the *best* Compass now in use, being less affected by *local attractions* and the motion of the ship, in a seaway.

Yours, &c., Charles S. Boggs, Commander, U. S. Navy,
May 2, 1857. Commanding U. S. Mail Steamer "Illinois."

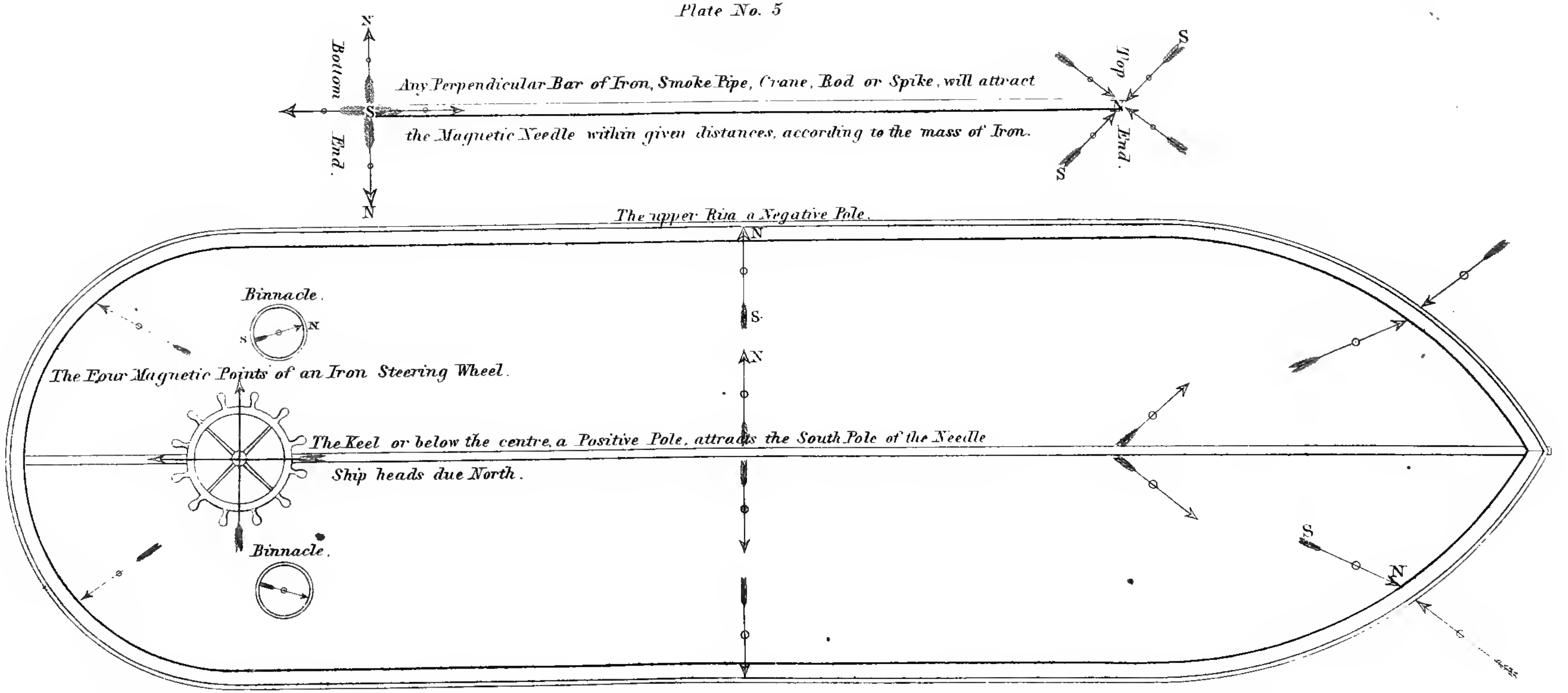
New York, March 1, 1858.

I hereby certify that Mr. Hall Colby's Patent Marine Compasses have been in constant use on board of the ship "New World," for the last eight years, and I am fully satisfied that they are more steady in heavy weather, and less subject to local attractions than any other Compass I have ever used. H. Knight, Master Ship "New World."

I certify that having manufactured Hall Colby's Improved Compass, and investigated its principles as a Marine Binnacle Compass, I believe it possesses decided merit over the common Compass for accuracy and directive force.

Robert Merrill,
Manufacturer, and Mathematical Instrument Maker,
No. 152 Front-street, New York.

Plate No. 5

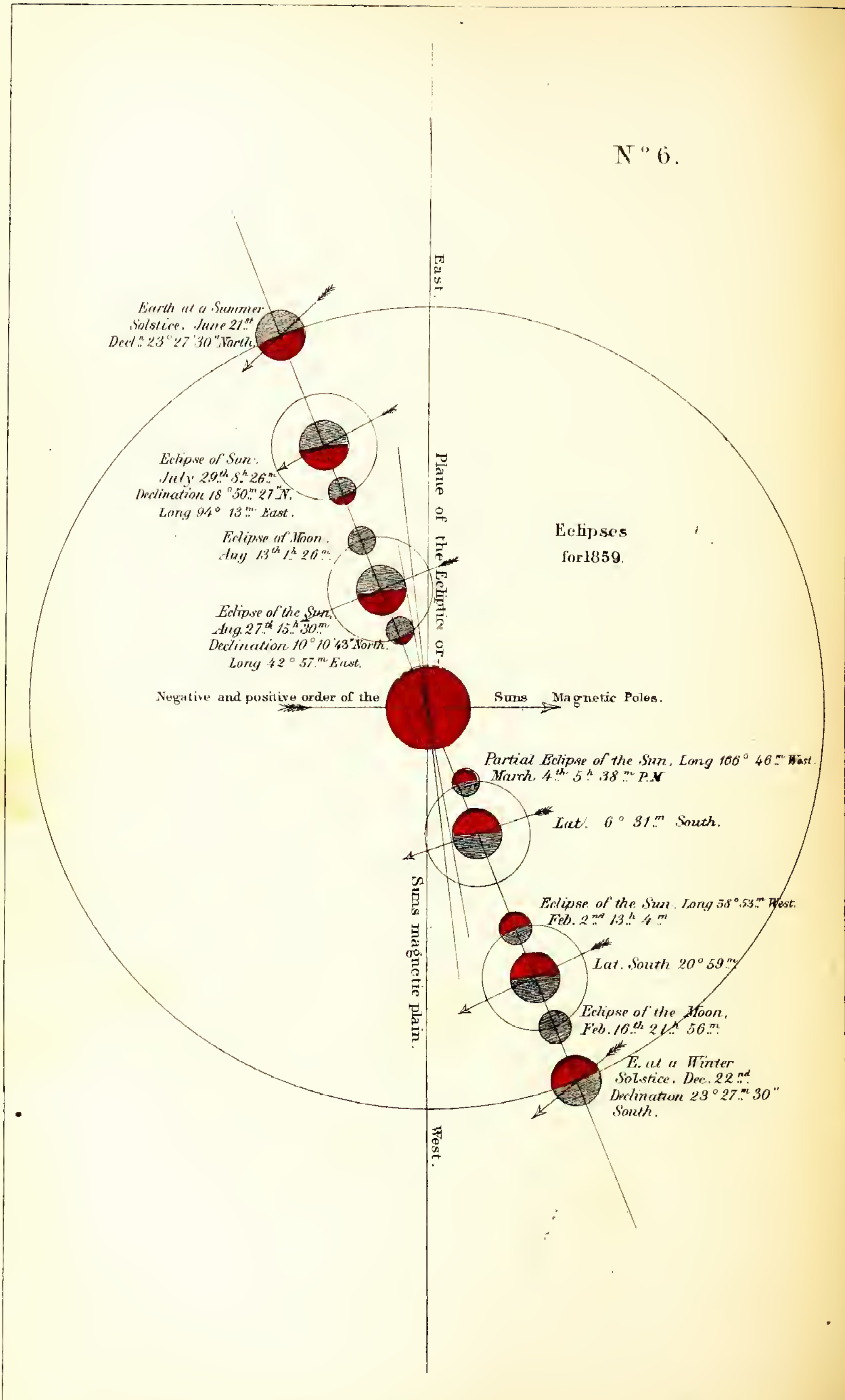


This diagram of an Iron Ship's Hull exibits its attractive powers, and constitutes the causes of local attraction under all the varied forms of Ship Building, where Iron Tubes, Rods, Spikes Cut Nails &c are made use of. There being but one law to produce local attraction; Compasses are generally right when the Ship heads due N. & S. but always vary more or less under ¼ Heading. All Compasses should be at least 3 feet apart, where two are used at the Steerage. In Iron Ships, Compasses should be placed Mid Ship, and single.

NAUTICAL ALMANAC

FOR THE YEAR

1859.



Lith of J Bien, 60 Fulton Street N.Y.

ECLIPSES OF THE SUN AND MOON FOR 1859.

I.—*A Partial Eclipse of the SUN, February* 2, 1859, *invisible at Greenwich.*

ELEMENTS.

		d.	h.	m.	s.
Greenwich Mean Time of ☌ in R. A.	Feb.	2	12	6	31
☉'s and ☽'s Right Ascension			21	4	37
			°	′	″
☽'s Declination		S.	18	15	20
☉'s Declination		S.	16	43	54

Longitude 58° 53′ W. of Greenwich. Latitude 66° 38′ S.

II.—*A Total Eclipse of the MOON, February* 16–17, 1859, *invisible at Greenwich.*

ELEMENTS.

		d.	h.	m.	s.
Greenwich Mean Time of ☍ in R. A.	Feb.	16	22	37	42
☽'s Right Ascension			10	1	48
			°	′	″
☽'s Declination		N.	12	11	8
☉'s Declination		S.	12	4	47

Longitude 117° 57′ W. of Greenwich. Latitude 12° 58′ N.

III.—*A Partial Eclipse of the SUN, March* 4, 1859, *invisible at Greenwich.*

ELEMENTS.

		d.	h.	m.	s.
Greenwich Mean Time of ☌ in R. A.	March	4	8	22	43
☉'s and ☽'s Right Ascension			23	0	11
			°	′	″
☽'s Declination		S.	4	54	41
☉'s Declination		S.	6	23	22

Longitude 166° 46′ W. of Greenwich. Latitude 36° 47′ N.

IV.—*A Partial Eclipse of the SUN, July* 29, 1859, *invisible at Greenwich.*

ELEMENTS.

		d.	h.	m.	s.
Greenwich Mean Time of ☌ in R. A.	July	29	9	9	15
☉'s and ☽'s Right Ascension			8	34	7
			°	′	″
☽'s Declination		N.	20	7	5
☉'s Declination		N.	18	45	6

Longitude 94° 13′ E. of Greenwich. Latitude 66° 26′ N.

V.—*A Total Eclipse of the MOON, August* 13, 1859, *invisible at Greenwich.*

ELEMENTS.

		d.	h.	m.	s.
Greenwich Mean Time of ☍ in R. A.	Aug.	13	4	34	20
☽'s Right Ascension			21	30	59
			°	′	″
☽'s Declination		S.	14	42	51
☉'s Declination		N.	14	43	6

Longitude 158° 12′ E. of Greenwich. Latitude 15° 26′ S.

VI.—*A Partial Eclipse of the SUN, August* 27, 1859, *invisible at Greenwich.*

ELEMENTS.

		d.	h.	m.	s.
Greenwich Mean Time of ☌ in R. A.	Aug.	27	18	6	50
☉'s and ☽'s Right Ascension			10	25	0
			°	′	″
☽'s Declination		N.	8	28	51
☉'s Declination		N.	9	54	49

Longitude 42° 57′ E. of Greenwich. Latitude 28° 3′ S.

PHASES OF THE MOON FOR 1859.

JANUARY.

	d.	h.	m.
New Moon	3	17	25·6
First Quarter . . .	11	19	22·6
Full Moon	18	11	48·6
Last Quarter . . .	25	8	45·0

FEBRUARY.

	d.	h.	m.
New Moon	2	13	4·3
First Quarter . . .	10	7	39·9
Full Moon	16	22	41·5
Last Quarter . . .	24	2	21·2

MARCH.

	d.	h.	m.
New Moon	4	7	10·6
First Quarter . . .	11	16	39·3
Full Moon	18	9	45·1
Last Quarter . . .	25	21	27·4

APRIL.

	d.	h.	m.
New Moon	2	22	17·5
First Quarter . . .	9	23	20·7
Full Moon	16	21	5·9
Last Quarter . . .	24	16	45·2

MAY.

	d.	h.	m.
New Moon	2	10	4·4
First Quarter . . .	9	4	59·1
Full Moon	16	9	6·8
Last Quarter . . .	24	10	49·3
New Moon	31	19	10·0

JUNE.

	d.	h.	m.
First Quarter . . .	7	10	47·5
Full Moon	14	22	17·8
Last Quarter . . .	23	2	31·9
New Moon	30	2	40·7

JULY.

	d.	h.	m.
First Quarter . . .	6	17	53·9
Full Moon	14	12	53·2
Last Quarter . . .	22	15	25·7
New Moon	29	9	43·6

AUGUST.

	d.	h.	m.
First Quarter . . .	5	3	21·6
Full Moon	13	4	34·2
Last Quarter . . .	21	1	45·7
New Moon	27	17	13·5

SEPTEMBER.

	d.	h.	m.
First Quarter . . .	3	16	4·7
Full Moon	11	20	31·3
Last Quarter . . .	19	10	13·8
New Moon	26	1	55·8

OCTOBER.

	d.	h.	m.
First Quarter . . .	3	8	31·9
Full Moon	11	11	51·2
Last Quarter . . .	18	17	42·7
New Moon	25	12	32·4

NOVEMBER.

	d.	h.	m.
First Quarter . . .	2	4	18·6
Full Moon	10	2	5·0
Last Quarter . . .	17	1	6·0
New Moon	24	1	42·7

DECEMBER.

	d.	h.	m.
First Quarter . . .	2	1	49·9
Full Moon	9	15	12·6
Last Quarter . . .	16	9	15·3
New Moon	23	17	47·2
First Quarter . . .	31	22	47·7

1859. AT GREENWICH APPARENT NOON. 1859.

JANUARY, 1859.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, *to be added to Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Sat.	1	S.23 2 7	12	3 43	1
Sun.	2	22 57 1	13	4 12	1
Mon.	3	22 51 27	15	4 40	1
Tues.	4	22 45 26	16	5 7	1
Wed.	5	22 38 57	17	5 35	1
Thur.	6	22 32 2	18	6 1	1
Fri.	7	22 24 40	19	6 28	1
Sat.	8	22 16 51	20	6 54	1
Sun.	9	22 8 37	21	7 19	1
Mon.	10	21 59 56	22	7 44	1
Tues.	11	21 50 50	23	8 8	0
Wed.	12	21 41 18	24	8 31	0
Thur.	13	21 31 21	25	8 54	0
Fri.	14	21 20 59	26	9 16	0
Sat.	15	21 10 13	27	9 38	0
Sun.	16	20 59 2	28	9 59	0
Mon.	17	20 47 28	29	10 19	0
Tues.	18	20 35 29	30	10 38	0
Wed.	19	20 23 8	31	10 57	0
Thur.	20	20 10 23	32	11 15	0
Fri.	21	19 57 16	33	11 32	0
Sat.	22	19 43 47	34	11 49	0
Sun.	23	19 29 55	35	12 4	0
Mon.	24	19 15 42	36	12 19	0
Tues.	25	19 1 7	37	12 34	0
Wed.	26	18 46 12	38	12 47	0
Thur.	27	18 30 56	39	13 0	0
Fri.	28	18 15 20	39	13 11	0
Sat.	29	17 59 24	40	13 22	0
Sun.	30	17 43 9	41	13 33	0
Mon.	31	17 26 34	42	13 42	0
Tues.	32	S.17 9 41		13 51	

FEBRUARY, 1859.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, *to be added to Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Tues.	1	S.17 9 41	42	13 51	0
Wed.	2	16 52 30	43	13 58	0
Thur.	3	16 35 2	44	14 5	0
Fri.	4	16 17 16	45	14 11	0
Sat.	5	15 59 13	45	14 17	0
Sun.	6	15 40 54	46	14 21	0
Mon.	7	15 22 19	47	14 25	0
Tues.	8	15 3 28	47	14 27	0
Wed.	9	14 44 22	48	14 29	0
Thur.	10	14 25 2	48	14 31	0
Fri.	11	14 5 27	49	14 31	0
Sat.	12	13 45 38	50	14 31	0
Sun.	13	13 25 37	50	14 29	0
Mon.	14	13 5 22	51	14 28	0
Tues.	15	12 44 54	51	14 25	0
Wed.	16	12 24 14	52	14 21	0
Thur.	17	12 3 23	52	14 17	0
Fri.	18	11 42 20	53	14 12	0
Sat.	19	11 21 6	53	14 7	0
Sun.	20	10 59 41	53	14 1	0
Mon.	21	10 38 6	54	13 54	0
Tues.	22	10 16 21	54	13 46	0
Wed.	23	9 54 26	55	13 38	0
Thur.	24	9 32 23	55	13 29	0
Fri.	25	9 10 11	55	13 20	0
Sat.	26	8 47 50	56	13 10	0
Sun.	27	8 25 21	56	13 0	0
Mon.	28	8 2 45	56	12 49	0
Tues.	29	S. 7 40 2		12 37	

1859. AT GREENWICH APPARENT NOON. 1859.

MARCH, 1859.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, to be added to Apparent Time.	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Tues.	1	S. 7 40 2	57	12 37	0
Wed.	2	7 17 12	57	12 25	0
Thur.	3	6 54 16	57	12 13	0
Fri.	4	6 31 14	57	12 0	0
Sat.	5	6 8 7	58	11 47	0
Sun.	6	5 44 55	58	11 33	0
Mon.	7	5 21 38	58	11 19	0
Tues.	8	4 58 17	58	11 4	0
Wed.	9	4 34 52	58	10 49	0
Thur.	10	4 11 24	58	10 33	0
Fri.	11	3 47 53	58	10 18	0
Sat.	12	3 24 19	59	10 1	0
Sun.	13	3 0 44	59	9 45	0
Mon.	14	2 37 6	59	9 28	0
Tues.	15	2 13 27	59	9 11	0
Wed.	16	1 49 46	59	8 54	0
Thur.	17	1 26 5	59	8 36	0
Fri.	18	1 2 23	59	8 19	0
Sat.	19	0 38 41	59	8 1	0
Sun.	20	S. 0 15 0	59	7 43	0
Mon.	21	N. 0 8 40	59	7 25	0
Tues.	22	0 32 21	59	7 6	0
Wed.	23	0 56 0	59	6 48	0
Thur.	24	1 19 37	58	6 29	0
Fri.	25	1 43 13	58	6 11	0
Sat.	26	2 6 46	58	5 52	0
Sun.	27	2 30 17	58	5 34	0
Mon.	28	2 53 45	58	5 15	0
Tues.	29	3 17 10	58	4 57	0
Wed.	30	3 40 30	58	4 39	0
Thur.	31	4 3 47	58	4 20	0
Fri.	32	N. 4 27 0		4 2	

APRIL, 1859.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, to be added to / subt. from Apparent Time.	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Fri.	1	N. 4 27 0	57	4 2	0
Sat.	2	4 50 7	57	3 44	0
Sun.	3	5 13 10	57	3 26	0
Mon.	4	5 36 7	57	3 8	0
Tues.	5	5 58 58	56	2 51	0
Wed.	6	6 21 42	56	2 33	0
Thur.	7	6 44 20	56	2 16	0
Fri.	8	7 6 51	55	1 59	0
Sat.	9	7 29 15	55	1 42	0
Sun.	10	7 51 31	55	1 25	0
Mon.	11	8 13 39	54	1 9	0
Tues.	12	8 35 39	54	0 53	0
Wed.	13	8 57 30	54	0 37	0
Thur.	14	9 19 11	53	0 21	0
Fri.	15	9 40 44	53	0 6	0
Sat.	16	10 2 7	53	0 8	0
Sun.	17	10 23 20	52	0 23	0
Mon.	18	10 44 23	52	0 37	0
Tues.	19	11 5 15	51	0 51	0
Wed.	20	11 25 57	51	1 4	0
Thur.	21	11 46 27	50	1 17	0
Fri.	22	12 6 46	50	1 29	0
Sat.	23	12 26 54	49	1 41	0
Sun.	24	12 46 49	49	1 53	0
Mon.	25	13 6 31	48	2 4	0
Tues.	26	13 26 1	48	2 15	0
Wed.	27	13 45 18	47	2 25	0
Thur.	28	14 4 21	47	2 34	0
Fri.	29	14 23 10	46	2 43	0
Sat.	30	14 41 45	45	2 52	0
Sun.	31	N.15 0 6		3 0	

1859. AT GREENWICH APPARENT NOON. 1859.

MAY, 1859.

Day of the Week.	Day of the Month.	THE SUN'S *Apparent* Declination.	Diff. for 1 hr.	Equation of Time, *to be subt. from Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Sun.	1	N.15 0 6	45	3 0	0
Mon.	2	15 18 12	44	3 7	0
Tues.	3	15 36 3	43	3 14	0
Wed.	4	15 53 38	43	3 20	0
Thur.	5	16 10 58	42	3 26	0
Fri.	6	16 28 1	41	3 31	0
Sat.	7	16 44 48	41	3 36	0
Sun.	8	17 1 18	40	3 40	0
Mon.	9	17 17 31	39	3 43	0
Tues.	10	17 33 27	39	3 46	0
Wed.	11	17 49 5	38	3 49	0
Thur.	12	18 4 25	37	3 51	0
Fri.	13	18 19 27	36	3 52	0
Sat.	14	18 34 10	36	3 53	0
Sun.	15	18 48 35	35	3 53	0
Mon.	16	19 2 40	34	3 53	0
Tues.	17	19 16 27	33	3 52	0
Wed.	18	19 29 54	32	3 50	0
Thur.	19	19 43 1	31	3 48	0
Fri.	20	19 55 48	31	3 45	0
Sat.	21	20 8 15	30	3 42	0
Sun.	22	20 20 21	29	3 38	0
Mon.	23	20 32 7	28	3 34	0
Tues.	24	20 43 32	27	3 29	0
Wed.	25	20 54 35	26	3 24	0
Thur.	26	21 5 17	25	3 18	0
Fri.	27	21 15 37	24	3 12	0
Sat.	28	21 25 35	24	3 5	0
Sun.	29	21 35 11	23	2 57	0
Mon.	30	21 44 24	22	2 50	0
Tues.	31	21 53 15	21	2 41	0
Wed.	32	N.22 1 43		2 33	

JUNE, 1859.

Day of the Week.	Day of the Month.	THE SUN'S *Apparent* Declination.	Diff. for 1 hr.	Equation of Time, *to be subt. from* / *added to Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Wed.	1	N.22 1 43	20	2 33	0
Thur.	2	22 9 48	19	2 24	0
Fri.	3	22 17 30	18	2 14	0
Sat.	4	22 24 48	17	2 4	0
Sun.	5	22 31 43	16	1 54	0
Mon.	6	22 38 14	15	1 43	0
Tues.	7	22 44 22	14	1 33	0
Wed.	8	22 50 5	13	1 22	0
Thur.	9	22 55 25	12	1 10	0
Fri.	10	23 0 20	11	0 59	0
Sat.	11	23 4 51	10	0 47	0
Sun.	12	23 8 57	9	0 35	0
Mon.	13	23 12 40	8	0 23	0
Tues.	14	23 15 57	7	0 10	0
Wed.	15	23 18 50	6	0 1	0
Thur.	16	23 21 19	5	0 14	0
Fri.	17	23 23 23	4	0 27	0
Sat.	18	23 25 2	3	0 40	0
Sun.	19	23 26 17	2	0 52	0
Mon.	20	23 27 6	1	1 5	0
Tues.	21	23 27 31	0	1 18	0
Wed.	22	23 27 31	1	1 31	0
Thur.	23	23 27 6	2	1 44	0
Fri.	24	23 26 17	3	1 57	0
Sat.	25	23 25 2	4	2 10	0
Sun.	26	23 23 23	5	2 23	0
Mon.	27	23 21 19	6	2 35	0
Tues.	28	23 18 51	7	2 48	0
Wed.	29	23 15 57	8	3 0	0
Thur.	30	23 12 40	9	3 12	0
Fri.	31	N.23 8 57		3 24	

1859. AT GREENWICH APPARENT NOON. 1859.

JULY, 1859.						AUGUST, 1859.					
Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, *to be added to Apparent Time.*	Diff. for 1 hr.	Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, *to be added to* / *subt. from Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.			° ′ ″	″	m. s.	s.
Fri.	1	N.23 8 57	10	3 24	0	Mon.	1	N.18 6 42	37	6 4	0
Sat.	2	23 4 51	11	3 36	0	Tues.	2	17 51 31	38	6 1	0
Sun.	3	23 0 20	12	3 47	0	Wed.	3	17 36 3	39	5 56	0
Mon.	4	22 55 25	13	3 59	0	Thur.	4	17 20 18	40	5 52	0
Tues.	5	22 50 7	14	4 9	0	Fri.	5	17 4 16	40	5 46	0
Wed.	6	22 44 24	15	4 20	0	Sat.	6	16 47 57	41	5 40	0
Thur.	7	22 38 18	16	4 30	0	*Sun.*	7	16 31 23	42	5 34	0
Fri.	8	22 31 48	17	4 39	0	Mon.	8	16 14 32	42	5 26	0
Sat.	9	22 24 55	18	4 49	0	Tues.	9	15 57 26	43	5 19	0
Sun.	10	22 17 39	19	4 58	0	Wed.	10	15 40 4	44	5 10	0
Mon.	11	22 10 0	20	5 6	0	Thur.	11	15 22 28	44	5 1	0
Tues.	12	22 1 58	21	5 14	0	Fri.	12	15 4 37	45	4 52	0
Wed.	13	21 53 33	21	5 21	0	Sat.	13	14 46 31	45	4 42	0
Thur.	14	21 44 46	22	5 28	0	*Sun.*	14	14 28 11	46	4 31	0
Fri.	15	21 35 37	23	5 35	0	Mon.	15	14 9 38	46	4 20	0
Sat.	16	21 26 5	24	5 41	0	Tues.	16	13 50 50	47	4 8	0
Sun.	17	21 16 12	25	5 46	0	Wed.	17	13 31 50	48	3 56	0
Mon.	18	21 5 57	26	5 51	0	Thur.	18	13 12 36	48	3 43	0
Tues.	19	20 55 20	27	5 56	0	Fri.	19	12 53 10	49	3 30	0
Wed.	20	20 44 23	28	6 0	0	Sat.	20	12 33 32	49	3 16	0
Thur.	21	20 33 4	29	6 3	0	*Sun.*	21	12 13 41	50	3 2	0
Fri.	22	20 21 25	30	6 6	0	Mon.	22	11 53 39	50	2 47	0
Sat.	23	20 9 25	30	6 9	0	Tues.	23	11 33 25	51	2 32	0
Sun.	24	19 57 4	31	6 11	0	Wed.	24	11 13 0	51	2 17	0
Mon.	25	19 44 24	32	6 12	0	Thur.	25	10 52 24	51	2 1	0
Tues.	26	19 31 23	33	6 12	0	Fri.	26	10 31 38	52	1 44	0
Wed.	27	19 18 4	34	6 13	0	Sat.	27	10 10 42	52	1 28	0
Thur.	28	19 4 25	34	6 12	0	*Sun.*	28	9 49 36	53	1 11	0
Fri.	29	18 50 27	35	6 11	0	Mon.	29	9 28 21	53	0 53	0
Sat.	30	18 36 10	36	6 9	0	Tues.	30	9 6 56	53	0 35	0
Sun.	31	18 21 35	37	6 7	0	Wed.	31	8 45 23	54	0 17	0
Mon.	32	N.18 6 42		6 4		Thur.	32	N. 8 23 42		0 0	

1859. AT GREENWICH APPARENT NOON. 1859.

SEPTEMBER, 1859.							OCTOBER, 1859.						
Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, to be subt. from Apparent Time.	Diff. for 1 hr.		Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, to be subt. from Apparent Time.	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.				° ′ ″	″	m. s.	s.
Thur.	1	N. 8 23 42	54	0 0	0		Sat.	1	S. 3 5 1	58	10 12	0
Fri.	2	8 1 52	54	0 19	0		*Sun.*	2	3 28 19	58	10 31	0
Sat.	3	7 39 55	55	0 38	0		Mon.	3	3 51 36	58	10 50	0
Sun.	4	7 17 51	55	0 57	0		Tues.	4	4 14 49	57	11 8	0
Mon.	5	6 55 40	55	1 17	0		Wed.	5	4 38 0	57	11 26	0
Tues.	6	6 33 21	56	1 37	0		Thur.	6	5 1 7	57	11 44	0
Wed.	7	6 10 57	56	1 57	0		Fri.	7	5 24 10	57	12 2	0
Thur.	8	5 48 27	56	2 17	0		Sat.	8	5 47 8	57	12 19	0
Fri.	9	5 25 50	56	2 38	0		*Sun.*	9	6 10 3	57	12 35	0
Sat.	10	5 3 9	56	2 58	0		Mon.	10	6 32 52	56	12 51	0
Sun.	11	4 40 22	57	3 19	0		Tues.	11	6 55 36	56	13 7	0
Mon.	12	4 17 30	57	3 40	0		Wed.	12	7 18 15	56	13 22	0
Tues.	13	3 54 34	57	4 1	0		Thur.	13	7 40 47	56	13 37	0
Wed.	14	3 31 34	57	4 22	0		Fri.	14	8 3 14	55	13 51	0
Thur.	15	3 8 30	57	4 43	0		Sat.	15	8 25 33	55	14 5	0
Fri.	16	2 45 22	57	5 5	0		*Sun.*	16	8 47 46	55	14 18	0
Sat.	17	2 22 11	58	5 26	0		Mon.	17	9 9 51	54	14 30	0
Sun.	18	1 58 56	58	5 47	0		Tues.	18	9 31 49	54	14 42	0
Mon.	19	1 35 39	58	6 8	0		Wed.	19	9 53 38	54	14 53	0
Tues.	20	1 12 20	58	6 29	0		Thur.	20	10 15 19	53	15 4	0
Wed.	21	0 48 59	58	6 50	0		Fri.	21	10 36 51	53	15 14	0
Thur.	22	0 25 36	58	7 11	0		Sat.	22	10 58 14	53	15 23	0
Fri.	23	N. 0 2 12	58	7 32	0		*Sun.*	23	11 19 26	52	15 32	0
Sat.	24	S. 0 21 12	58	7 53	0		Mon.	24	11 40 29	52	15 39	0
Sun.	25	0 44 37	58	8 13	0		Tues.	25	12 1 21	51	15 47	0
Mon.	26	1 8 3	58	8 34	0		Wed.	26	12 22 2	51	15 53	0
Tues.	27	1 31 28	58	8 54	0		Thur.	27	12 42 31	50	15 59	0
Wed.	28	1 54 53	58	9 14	0		Fri.	28	13 2 49	50	16 4	0
Thur.	29	2 18 17	58	9 33	0		Sat.	29	13 22 54	49	16 8	0
Fri.	30	2 41 40	58	9 53	0		*Sun.*	30	13 42 47	49	16 11	0
							Mon.	31	14 2 26	48	16 14	0
Sat.	31	S. 3 5 1		10 12			Tues.	32	S. 14 21 52		16 16	

1859. AT GREENWICH APPARENT NOON. 1859.

NOVEMBER, 1859.						DECEMBER, 1859.					
Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, to be subt. from Apparent Time.	Diff. for 1 hr.	Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, to be subt. from / added to Apparent Time.	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.			° ′ ″	″	m. s.	s.
Tues.	1	S.14 21 52	48	16 16	0	Thur.	1	S.21 47 17	23	10 52	0
Wed.	2	14 41 4	47	16 17	0	Fri.	2	21 56 30	22	10 29	0
Thur.	3	15 0 1	46	16 18	0	Sat.	3	22 5 18	20	10 6	0
Fri.	4	15 18 44	46	16 17	0	*Sun.*	4	22 13 41	19	9 42	1
Sat.	5	15 37 11	45	16 16	0	Mon.	5	22 21 37	18	9 18	1
Sun.	6	15 55 23	44	16 14	0	Tues.	6	22 29 8	17	8 52	1
Mon.	7	16 13 19	44	16 11	0	Wed.	7	22 36 12	16	8 27	1
Tues.	8	16 30 59	43	16 7	0	Thur.	8	22 42 49	15	8 1	1
Wed.	9	16 48 22	42	16 3	0	Fri.	9	22 49 0	14	7 34	1
Thur.	10	17 5 28	42	15 58	0	Sat.	10	22 54 44	13	7 7	1
Fri.	11	17 22 16	41	15 51	0	*Sun.*	11	23 0 1	12	6 40	1
Sat.	12	17 38 46	40	15 44	0	Mon.	12	23 4 50	10	6 12	1
Sun.	13	17 54 59	39	15 36	0	Tues.	13	23 9 12	9	5 44	1
Mon.	14	18 10 52	38	15 28	0	Wed.	14	23 13 7	8	5 15	1
Tues.	15	18 26 27	38	15 18	0	Thur.	15	23 16 33	7	4 46	1
Wed.	16	18 41 42	37	15 7	0	Fri.	16	23 19 32	6	4 17	1
Thur.	17	18 56 37	36	14 56	0	Sat.	17	23 22 3	5	3 48	1
Fri.	18	19 11 12	35	14 44	0	*Sun.*	18	23 24 5	3	3 18	1
Sat.	19	19 25 27	34	14 31	0	Mon.	19	23 25 40	2	2 49	1
Sun.	20	19 39 20	33	14 17	0	Tues.	20	23 26 46	1	2 19	1
Mon.	21	19 52 52	32	14 2	0	Wed.	21	23 27 24	0	1 49	1
Tues.	22	20 6 3	32	13 47	0	Thur.	22	23 27 33	0	1 19	1
Wed.	23	20 18 51	31	13 30	0	Fri.	23	23 27 14	1	0 49	1
Thur.	24	20 31 17	30	13 13	0	Sat.	24	23 26 27	3	0 18	1
Fri.	25	20 43 19	29	12 55	0	*Sun.*	25	23 25 11	4	0 11	1
Sat.	26	20 54 59	28	12 36	0	Mon.	26	23 23 27	5	0 41	1
Sun.	27	21 6 15	27	12 17	0	Tues.	27	23 21 15	6	1 10	1
Mon.	28	21 17 7	26	11 57	0	Wed.	28	23 18 35	7	1 40	1
Tues.	29	21 27 35	25	11 36	0	Thur.	29	23 15 26	9	2 10	1
Wed.	30	21 37 38	24	11 14	0	Fri.	30	23 11 50	10	2 39	1
						Sat.	31	23 7 46	11	3 8	1
Thur.	31	S.21 47 17		10 52							
						Sun.	32	S.23 3 14		3 37	

THE MOON'S RIGHT ASCENSION AND DECLINATION.

JANUARY, 1859.

MEAN TIME.

Day.	Right Ascension. Midnight.	Declination. Noon.	Declination. Midnight.
	h. m. s.	° ′ ″	° ′ ″
1	17 1 0	S. 27 4 13	S. 27 41 22
2	17 54 48	27 59 0	27 56 55
3	18 48 1	27 35 19	26 54 41
4	19 39 38	25 55 49	24 39 45
5	20 29 4	23 7 44	21 21 9
6	21 16 12	19 21 23	17 9 56
7	22 1 23	14 48 13	12 17 36
8	22 45 17	9 39 28	6 55 7
9	23 28 47	S. 4 5 48	S. 1 12 50
10	0 12 58	N. 1 42 30	N. 4 38 49
11	0 58 59	7 34 35	10 28 10
12	1 48 7	13 17 38	16 0 48
13	2 41 35	18 35 9	20 57 48
14	3 40 13	23 5 34	24 54 57
15	4 43 57	26 22 24	27 24 29
16	5 51 16	27 58 13	28 1 23
17	6 59 19	27 32 55	26 33 3
18	8 5 5	25 3 14	23 6 8
19	9 6 37	20 45 15	18 4 33
20	10 3 30	15 8 15	12 0 28
21	10 56 26	8 45 6	N. 5 25 41
22	11 46 35	N. 2 5 22	S. 1 13 6
23	12 35 13	S. 4 27 18	7 35 9
24	13 23 32	10 34 49	13 24 39
25	14 12 28	16 3 10	18 29 0
26	15 2 41	20 40 51	22 37 33
27	15 54 26	24 17 58	25 41 5
28	16 47 29	26 46 0	27 32 2
29	17 41 9	27 58 42	28 5 45
30	18 34 29	27 53 13	27 21 28
31	19 26 30	S. 26 31 5	S. 25 22 57

FEBRUARY, 1859.

MEAN TIME.

Day.	Right Ascension. Midnight.	Declination. Noon.	Declination. Midnight.
	h. m. s.	° ′ ″	° ′ ″
1	20 16 33	S. 23 58 8	S. 22 17 53
2	21 4 25	20 23 33	18 16 33
3	21 50 16	15 58 21	13 30 24
4	22 34 39	10 54 12	8 11 9
5	23 18 20	S. 5 22 42	S. 2 30 16
6	0 2 13	N. 0 24 42	N. 3 20 44
7	0 47 21	6 16 18	9 9 47
8	1 34 50	11 59 24	14 43 14
9	2 25 47	17 19 8	19 44 44
10	3 21 5	21 57 25	23 54 20
11	4 21 2	25 32 33	26 49 2
12	5 24 53	27 41 0	28 5 59
13	6 30 42	28 2 16	27 28 53
14	7 35 55	26 26 0	24 54 45
15	8 38 22	22 57 15	20 36 22
16	9 37 2	17 55 31	14 58 26
17	10 32 3	11 48 59	8 30 54
18	11 24 13	N. 5 7 49	N. 1 43 6
19	12 14 40	S. 1 40 13	S. 4 59 19
20	13 4 29	8 11 45	11 15 19
21	13 54 38	14 8 3	16 48 12
22	14 45 46	19 14 14	21 24 44
23	15 38 12	23 18 29	24 54 28
24	16 31 45	26 11 47	27 9 45
25	17 25 50	27 47 58	28 6 13
26	18 19 34	28 4 35	27 43 22
27	19 12 2	27 3 10	26 4 46
28	20 2 38	S. 24 49 8	S. 23 17 24

THE MOON'S RIGHT ASCENSION AND DECLINATION.

MARCH, 1859. MEAN TIME.				APRIL, 1859. MEAN TIME.			
RIGHT ASCENSION.		DECLINATION.		RIGHT ASCENSION.		DECLINATION.	
Day.	Midnight.	Noon.	Midnight.	Day.	Midnight.	Noon.	Midnight.
	h. m. s.	° ′ ″	° ′ ″		h. m. s.	° ′ ″	° ′ ″
1	20 51 6	S. 21 30 47	S. 19 30 37	1	23 37 12	S. 2 57 15	N. 0 0 6
2	21 37 36	17 18 14	14 55 1	2	0 22 38	N. 2 59 17	5 58 31
3	22 22 37	12 22 22	9 41 44	3	1 10 1	8 55 53	11 49 17
4	23 6 50	6 54 32	S. 4 2 16	4	2 0 19	14 36 26	17 14 52
5	23 51 7	S. 1 6 27	N. 1 51 20	5	2 54 18	19 41 55	21 54 51
6	0 36 24	N. 4 49 26	7 46 4	6	3 52 14	23 50 50	25 27 6
7	1 23 40	10 39 23	13 27 23	7	4 53 34	26 41 6	27 30 41
8	2 13 56	16 7 53	18 38 34	8	5 56 47	27 54 11	27 50 39
9	3 7 56	20 56 59	23 0 31	9	6 59 45	27 19 53	26 22 31
10	4 6 0	24 46 31	26 12 19	10	8 0 36	24 59 50	23 13 46
11	5 7 34	27 15 26	27 53 44	11	8 58 15	21 6 40	18 41 10
12	6 11 8	28 5 33	27 49 52	12	9 52 37	16 0 3	13 6 13
13	7 14 34	27 6 28	25 55 56	13	10 44 21	10 2 29	6 51 37
14	8 15 57	24 19 38	22 19 35	14	11 34 25	N. 3 36 23	N. 0 19 25
15	9 14 13	19 58 21	17 18 50	15	12 23 54	S. 2 56 44	S. 6 9 33
16	10 9 16	14 24 12	11 17 42	16	13 13 48	9 16 36	12 15 34
17	11 1 45	8 2 36	N. 4 42 6	17	14 4 57	15 4 10	17 40 18
18	11 52 36	N. 1 19 19	S. 2 2 49	18	14 57 46	20 1 57	22 7 17
19	12 42 54	S. 5 21 29	8 34 4	19	15 52 12	23 54 46	25 23 2
20	13 33 34	11 38 7	14 31 24	20	16 47 39	26 31 6	27 18 22
21	14 25 17	17 11 52	19 37 41	21	17 43 6	27 44 34	27 49 49
22	15 18 23	21 47 11	23 38 59	22	18 37 25	27 34 38	26 59 48
23	16 12 43	25 11 55	26 25 6	23	19 29 42	26 6 21	24 55 31
24	17 7 38	27 17 58	27 50 12	24	20 19 31	23 28 36	21 46 59
25	18 2 14	28 1 51	27 53 15	25	21 6 57	19 51 59	17 44 58
26	18 55 31	27 25 1	26 37 56	26	21 52 30	15 27 12	12 59 55
27	19 46 50	25 33 4	24 11 31	27	22 36 53	10 24 21	7 41 41
28	20 35 53	22 34 32	20 43 23	28	23 21 2	S. 4 53 8	S. 2 0 1
29	21 22 51	18 39 21	16 23 43	29	0 5 57	N. 0 56 19	N. 3 54 18
30	22 8 13	13 57 47	11 22 50	30	0 52 44	N. 6 52 16	N. 9 48 18
31	22 52 43	S. 8 40 11	S. 5 51 11				

THE MOON'S RIGHT ASCENSION AND DECLINATION.

MAY, 1859.				JUNE, 1859.			
MEAN TIME.				MEAN TIME.			
RIGHT ASCENSION.		DECLINATION.		RIGHT ASCENSION.		DECLINATION.	
Day.	Midnight.	Noon.	Midnight.	Day.	Midnight.	Noon.	Midnight.
	h. m. s.	° ′ ″	° ′ ″		h. m. s.	° ′ ″	° ′ ″
1	1 42 28	N.12 40 11	N.15 25 30	1	5 17 10	N.27 5 23	N.27 34 42
2	2 36 4	18 1 33	20 25 22	2	6 23 30	27 34 45	27 5 8
3	3 34 2	22 33 52	24 23 53	3	7 28 20	26 6 35	24 40 51
4	4 35 57	25 52 22	26 56 37	4	8 29 36	22 50 32	20 38 45
5	5 40 17	27 34 29	27 44 34	5	9 26 34	18 8 55	15 24 29
6	6 44 40	27 26 23	26 40 23	6	10 19 40	12 28 50	9 25 5
7	7 46 50	25 27 53	23 50 59	7	11 9 55	N. 6 16 7	N. 3 4 33
8	8 45 25	21 52 11	19 34 25	8	11 58 35	S. 0 7 11	S. 3 16 54
9	9 40 12	17 0 38	14 13 50	9	12 46 52	6 22 33	9 22 12
10	10 31 48	11 16 52	8 12 30	10	13 35 50	12 13 58	14 56 4
11	11 21 18	N. 5 3 16	N. 1 51 39	11	14 26 19	17 26 42	19 44 9
12	12 9 50	S. 1 20 4	S. 4 29 40	12	15 18 43	21 46 46	23 32 56
13	12 58 34	7 34 58	10 33 54	13	16 12 52	25 1 17	26 10 37
14	13 48 26	13 24 21	16 4 20	14	17 8 4	27 0 0	27 28 54
15	14 40 3	18 31 50	20 44 59	15	18 3 8	27 37 7	27 24 55
16	15 33 36	22 41 58	24 21 14	16	18 56 51	26 52 55	26 2 2
17	16 28 42	25 41 25	26 41 28	17	19 48 17	24 53 30	23 28 42
18	17 24 22	27 20 46	27 39 3	18	20 37 5	21 49 10	19 56 26
19	18 19 23	27 36 30	27 13 39	19	21 23 22	17 52 0	15 37 20
20	19 12 34	26 31 24	25 30 56	20	22 7 43	13 13 51	10 42 51
21	20 3 16	24 13 34	22 40 47	21	22 50 55	8 5 33	S. 5 23 8
22	20 51 21	20 54 1	18 54 45	22	23 33 55	S. 2 36 46	N. 0 12 24
23	21 37 10	16 44 23	14 24 14	23	0 17 50	N. 3 3 9	5 54 11
24	22 21 25	11 55 34	9 19 35	24	1 3 50	8 44 2	11 31 5
25	23 4 58	6 37 25	S. 3 50 14	25	1 53 8	14 13 24	16 48 48
26	23 48 53	S. 0 59 12	N. 1 54 23	26	2 46 51	19 14 44	21 28 19
27	0 34 16	N. 4 49 10	7 43 35	27	3 45 37	23 26 24	25 5 36
28	1 22 20	10 35 49	13 23 49	28	4 49 9	26 22 32	27 14 3
29	2 14 13	16 5 11	18 37 13	29	5 55 43	27 37 34	27 31 19
30	3 10 47	20 56 52	23 0 51	30	7 2 32	N.26 54 40	N.25 48 12
31	4 12 8	N.24 45 46	N.26 8 17				

THE MOON'S RIGHT ASCENSION AND DECLINATION.

JULY, 1859.

MEAN TIME.

Day.	Right Ascension. Midnight.	Declination. Noon.	Declination. Midnight.
	h. m. s.	° ′ ″	° ′ ″
1	8 6 52	N.24 13 38	N.22 13 38
2	9 7 7	19 51 37	17 11 18
3	10 3 6	14 16 35	11 11 14
4	10 55 36	7 58 46	N. 4 27 28
5	11 45 46	N. 1 25 12	S. 1 50 24
6	12 34 55	S. 5 2 1	8 7 32
7	13 24 9	11 5 3	13 52 46
8	14 14 23	16 29 1	18 52 13
9	15 6 12	21 0 52	22 53 32
10	15 59 40	24 28 56	25 45 56
11	16 54 16	26 43 37	27 21 19
12	17 49 5	27 38 44	27 35 51
13	18 42 56	27 13 4	26 31 6
14	19 34 50	25 30 57	24 13 52
15	20 24 15	22 41 13	20 54 33
16	21 11 8	18 55 23	16 45 15
17	21 55 53	14 25 39	11 58 0
18	22 39 9	9 23 41	6 43 59
19	23 21 48	S. 4 0 8	S. 1 13 23
20	0 4 49	N. 1 35 3	N. 4 23 57
21	0 49 16	7 11 58	9 57 40
22	1 36 17	12 39 28	15 15 35
23	2 27 1	17 43 57	20 2 16
24	3 22 21	22 7 54	23 57 59
25	4 22 34	25 29 28	26 39 14
26	5 26 50	27 24 22	27 42 22
27	6 33 6	27 31 24	26 50 38
28	7 38 40	25 40 19	24 1 48
29	8 41 22	21 57 25	19 30 21
30	9 40 13	16 44 12	13 42 56
31	10 35 27	N.10 30 29	N. 7 10 43

AUGUST, 1859.

MEAN TIME.

Day.	Right Ascension. Midnight.	Declination. Noon.	Declination. Midnight.
	h. m. s.	° ′ ″	° ′ ″
1	11 27 58	N. 3 47 12	N. 0 23 16
2	12 18 56	S. 2 58 6	S. 6 14 15
3	13 9 29	9 22 47	12 21 36
4	14 0 35	15 8 46	17 42 35
5	14 52 50	20 1 31	22 4 8
6	15 46 26	23 49 14	25 15 46
7	16 41 2	26 22 53	27 9 59
8	17 35 52	27 36 46	27 43 14
9	18 29 52	27 29 39	26 56 38
10	19 22 7	26 5 4	24 56 3
11	20 12 3	23 30 51	21 50 51
12	20 59 31	19 57 33	17 52 24
13	21 44 48	15 36 54	13 12 31
14	22 28 29	10 40 41	8 2 47
15	23 11 19	S. 5 20 9	S. 2 34 7
16	23 54 9	N. 0 14 1	N. 3 2 52
17	0 37 59	5 51 8	8 37 21
18	1 23 47	11 20 0	13 57 25
19	2 12 36	16 27 48	18 49 9
20	3 5 18	20 59 15	22 55 43
21	4 2 20	24 35 58	25 57 21
22	5 3 23	26 57 14	27 33 11
23	6 7 7	27 43 9	27 25 42
24	7 11 26	26 40 8	25 26 38
25	8 14 13	23 46 20	21 41 9
26	9 14 9	19 13 42	16 27 10
27	10 10 59	13 25 4	10 11 4
28	11 5 13	N. 6 48 56	N. 3 22 17
29	11 57 49	S. 0 5 22	S. 3 30 44
30	12 49 50	6 50 48	10 2 48
31	13 42 12	S.13 4 14	S.15 52 53

THE MOON'S RIGHT ASCENSION AND DECLINATION.

SEPTEMBER, 1859.

MEAN TIME.

	Right Ascension.	Declination.	
Day.	Midnight.	Noon.	Midnight.
	h. m. s.	° ′ ″	° ′ ″
1	14 35 32	S. 18 26 46	S. 20 44 12
2	15 30 4	22 43 41	24 24 3
3	16 25 29	25 44 22	26 44 1
4	17 21 2	27 22 42	27 40 27
5	18 15 43	27 37 34	27 14 43
6	19 8 36	26 32 45	25 32 47
7	19 59 9	24 16 3	22 43 54
8	20 47 12	20 57 44	18 58 59
9	21 33 3	16 49 3	14 29 23
10	22 17 13	12 1 20	9 26 17
11	23 0 26	6 45 33	S. 4 0 30
12	23 43 31	S. 1 12 30	N. 1 37 4
13	0 27 23	N. 4 26 45	7 15 3
14	1 12 57	10 0 21	12 40 58
15	2 1 7	15 15 2	17 40 37
16	2 52 41	19 55 35	21 57 43
17	3 48 2	23 44 40	25 14 3
18	4 46 58	26 23 34	27 11 2
19	5 48 26	27 34 38	27 32 57
20	6 50 45	27 5 12	26 11 14
21	7 52 6	24 51 36	23 7 33
22	8 51 13	21 0 54	18 33 58
23	9 47 42	15 49 27	12 50 18
24	10 41 57	9 39 41	N. 6 20 49
25	11 34 45	N. 2 56 59	S. 0 28 33
26	12 27 6	S. 3 52 34	7 12 1
27	13 19 55	10 23 56	13 25 33
28	14 13 54	16 14 18	18 47 54
29	15 9 17	21 4 19	23 1 50
30	16 5 47	S. 24 39 5	S. 25 55 7

OCTOBER, 1859.

MEAN TIME.

	Right Ascension.	Declination.	
Day.	Midnight.	Noon.	Midnight.
	h. m. s.	° ′ ″	° ′ ″
1	17 2 36	S. 26 49 23	S. 27 21 43
2	17 58 35	27 32 22	27 21 58
3	18 52 41	26 51 28	26 2 2
4	19 44 16	24 54 59	23 31 47
5	20 33 7	21 53 54	20 2 47
6	21 19 33	17 59 53	15 46 35
7	22 4 7	13 24 12	10 54 1
8	22 47 36	8 17 19	5 35 20
9	23 30 51	S. 2 49 22	S. 0 0 43
10	0 14 48	N. 2 49 14	N. 5 38 58
11	1 0 23	8 26 53	11 11 15
12	1 48 30	13 50 9	16 21 31
13	2 39 54	18 43 9	20 52 40
14	3 35 0	22 47 41	24 25 43
15	4 33 32	25 44 24	26 41 36
16	5 34 27	27 15 30	27 24 47
17	6 36 4	27 8 43	26 27 12
18	7 36 35	25 20 50	23 50 47
19	8 34 47	21 58 44	19 46 46
20	9 30 18	17 17 15	14 32 43
21	10 23 29	11 35 50	8 29 18
22	11 15 10	N. 5 15 54	N. 1 58 22
23	12 6 24	S. 1 20 30	S. 4 37 55
24	12 58 12	7 51 5	10 57 17
25	13 51 24	13 53 46	16 37 59
26	14 46 26	19 7 28	21 19 58
27	15 43 10	23 13 34	24 46 40
28	16 40 50	25 58 7	26 47 15
29	17 38 11	27 13 54	27 18 23
30	18 33 52	27 1 30	26 24 20
31	19 26 57	S. 25 28 19	S. 24 15 0

THE MOON'S RIGHT ASCENSION AND DECLINATION.

NOVEMBER, 1859.				DECEMBER, 1859.			
MEAN TIME.				MEAN TIME.			
RIGHT ASCENSION.		DECLINATION.		RIGHT ASCENSION.		DECLINATION.	
Day.	Midnight.	Noon.	Midnight.	Day.	Midnight.	Noon.	Midnight.
	h. m. s.	° ′ ″	° ′ ″		h. m. s.	° ′ ″	° ′ ″
1	20 17 1	S. 22 46 2	S. 21 3 1	1	22 17 37	S. 11 18 20	S. 8 46 7
2	21 4 17	19 7 34	17 1 10	2	23 0 24	6 8 59	S. 3 28 3
3	21 49 17	14 45 13	12 21 2	3	23 43 10	S. 0 44 25	N. 2 0 49
4	22 32 52	9 49 50	7 12 49	4	0 27 2	N. 4 46 27	7 31 12
5	23 15 56	S. 4 31 7	S. 1 45 54	5	1 13 5	10 13 37	12 52 0
6	23 59 28	N. 1 1 36	N. 3 50 6	6	2 2 25	15 24 29	17 48 52
7	0 44 30	6 38 10	9 24 13	7	2 55 54	20 2 43	22 3 20
8	1 32 4	12 6 29	14 42 57	8	3 53 53	23 47 49	25 13 15
9	2 23 3	17 11 25	19 29 27	9	4 55 46	26 16 49	26 56 1
10	3 18 1	21 34 26	23 23 39	10	5 59 52	27 8 58	26 54 33
11	4 16 52	24 54 24	26 4 8	11	7 3 46	26 12 34	25 3 48
12	5 18 35	26 50 36	27 12 8	12	8 5 18	23 29 53	21 33 8
13	6 21 16	27 7 41	26 36 59	13	9 3 22	19 16 25	16 42 49
14	7 22 52	25 40 34	24 19 41	14	9 57 54	13 55 31	10 57 39
15	8 21 49	22 36 10	20 32 20	15	10 49 41	7 52 15	N. 4 42 5
16	9 17 35	18 10 44	15 34 2	16	11 39 49	N. 1 29 49	S. 1 42 6
17	10 10 28	12 44 59	9 46 15	17	12 29 31	S. 4 51 23	7 55 47
18	11 1 20	6 40 25	N. 3 30 4	18	13 19 53	10 53 13	13 41 36
19	11 51 19	N. 0 17 36	S. 2 54 32	19	14 11 48	16 18 55	18 43 12
20	12 41 32	S. 6 3 57	9 8 19	20	15 5 43	20 52 30	22 45 1
21	13 33 0	12 5 13	14 52 19	21	16 1 33	24 19 8	25 33 27
22	14 26 25	17 27 17	19 47 49	22	16 58 28	26 26 53	26 58 48
23	15 21 57	21 51 49	23 37 21	23	17 55 12	27 9 0	26 57 47
24	16 19 10	25 2 47	26 6 52	24	18 50 21	26 25 51	25 34 22
25	17 16 53	26 48 52	27 8 30	25	19 42 54	24 24 47	22 58 43
26	18 13 40	27 6 4	26 42 19	26	20 32 24	21 17 58	19 24 19
27	19 8 11	25 58 26	24 55 53	27	21 19 2	17 19 29	15 5 10
28	19 59 42	23 36 21	22 1 35	28	22 3 21	12 42 54	10 14 7
29	20 48 6	20 13 22	18 13 24	29	22 46 9	7 40 7	S. 5 2 8
30	21 33 50	S. 16 3 16	S. 13 44 27	30	23 28 25	S. 2 21 19	N. 0 21 14
				31	0 11 9	N. 3 4 26	N. 5 47 7

1859. AT GREENWICH MEAN NOON. 1859.

JANUARY.

Day of the Week.	Day of the Month.	The Moon's Age. *Noon.* d.	The Moon's Meridian Passage. h. m.
Sat.	1	27·1	22 38·7
Sun.	2	28·1	23 30·2
Mon.	3	29·1	☌
Tues.	4	0·3	0 20·5
Wed.	5	1·3	1 8·6
Thur.	6	2·3	1 54·2
Fri.	7	3·3	2 37·4
Sat.	8	4·3	3 18·9
Sun.	9	5·3	3 59·6
Mon.	10	6·3	4 40·7
Tues.	11	7·3	5 23·3
Wed.	12	8·3	6 9·0
Thur.	13	9·3	6 59·1
Fri.	14	10·3	7 54·9
Sat.	15	11·3	8 56·5
Sun.	16	12·3	10 2·5
Mon.	17	13·3	11 9·6
Tues.	18	14·3	12 14·2
Wed.	19	15·3	13 14·1
Thur.	20	16·3	14 8·7
Fri.	21	17·3	14 59·0
Sat.	22	18·3	15 46·5
Sun.	23	19·3	16 32·5
Mon.	24	20·3	17 18·3
Tues.	25	21·3	18 5·0
Wed.	26	22·3	18 53·3
Thur.	27	23·3	19 43·2
Fri.	28	24·3	20 34·4
Sat.	29	25·3	21 25·9
Sun.	30	26·3	22 16·5
Mon.	31	27·3	23 5·4
Tues.	32	28·3	23 51·9

FEBRUARY.

Day of the Week.	Day of the Month.	The Moon's Age. *Noon.* d.	The Moon's Meridian Passage. h. m.
Tues.	1	28·3	23 51·9
Wed.	2	29·3	☌
Thur.	3	0·5	0 36·1
Fri.	4	1·5	1 18·3
Sat.	5	2·5	1 59·4
Sun.	6	3·5	2 40·3
Mon.	7	4·5	3 22·0
Tues.	8	5·5	4 6·0
Wed.	9	6·5	4 53·3
Thur.	10	7·5	5 45·2
Fri.	11	8·5	6 42·2
Sat.	12	9·5	7 44·0
Sun.	13	10·5	8 48·5
Mon.	14	11·5	9 52·7
Tues.	15	12·5	10 53·9
Wed.	16	13·5	11 50·9
Thur.	17	14·5	12 43·8
Fri.	18	15·5	13 33·6
Sat.	19	16·5	14 21·6
Sun.	20	17·5	15 9·0
Mon.	21	18·5	15 56·8
Tues.	22	19·5	16 45·9
Wed.	23	20·5	17 36·3
Thur.	24	21·5	18 27·9
Fri.	25	22·5	19 19·9
Sat.	26	23·5	20 11·1
Sun.	27	24·5	21 0·7
Mon.	28	25·5	21 48·0
Tues.	29	26·5	22 33·0

MARCH.

Day of the Week.	Day of the Month.	The Moon's Age. *Noon.* d.	The Moon's Meridian Passage. h. m.
Tues.	1	26·5	22 33·0
Wed.	2	27·5	23 16·1
Thur.	3	28·5	23 57·8
Fri.	4	29·5	☌
Sat.	5	0·7	0 39·2
Sun.	6	1·7	1 21·1
Mon.	7	2·7	2 4·8
Tues.	8	3·7	2 51·3
Wed.	9	4·7	3 41·6
Thur.	10	5·7	4 36·4
Fri.	11	6·7	5 35·5
Sat.	12	7·7	6 37·3
Sun.	13	8·7	7 39·6
Mon.	14	9·7	8 39·9
Tues.	15	10·7	9 36·7
Wed.	16	11·7	10 30·0
Thur.	17	12·7	11 20·3
Fri.	18	13·7	12 8·9
Sat.	19	14·7	12 56·7
Sun.	20	15·7	13 45·1
Mon.	21	16·7	14 34·6
Tues.	22	17·7	15 25·7
Wed.	23	18·7	16 18·1
Thur.	24	19·7	17 10·9
Fri.	25	20·7	18 3·2
Sat.	26	21·7	18 53·8
Sun.	27	22·7	19 42·0
Mon.	28	23·7	20 27·8
Tues.	29	24·7	21 11·5
Wed.	30	25·7	21 53·6
Thur.	31	26·7	22 35·3
Fri.	32	27·7	23 17·3

1859. AT GREENWICH MEAN NOON. 1859.

APRIL.				MAY.				JUNE.			
Day of the Week.	Day of the Month.	THE MOON'S Age. Noon.	THE MOON'S Meridian Passage.	Day of the Week.	Day of the Month.	THE MOON'S Age. Noon.	THE MOON'S Meridian Passage.	Day of the Week.	Day of the Month.	THE MOON'S Age. Noon.	THE MOON'S Meridian Passage.
		d.	h. m.			d.	h. m.			d.	h. m.
Fri.	1	27·7	23 17·3	*Sun.*	1	28·1	23 28·2	Wed.	1	0·2	0 6·8
Sat.	2	28·7	☌	Mon.	2	29·1	☌	Thur.	2	1·2	1 11·8
Sun.	3	0·1	0 0·9	Tues.	3	0·6	0 21·9	Fri.	3	2·2	2 16·4
Mon.	4	1·1	0 47·2	Wed.	4	1·6	1 20·4	Sat.	4	3·2	3 17·7
Tues.	5	2·1	1 37·2	Thur.	5	2·6	2 22·6	*Sun.*	5	4·2	4 14·4
Wed.	6	3·1	2 31·5	Fri.	6	3·6	3 26·0	Mon.	6	5·2	5 6·4
Thur.	7	4·1	3 30·0	Sat.	7	4·6	4 27·7	Tues.	7	6·2	5 55·0
Fri.	8	5·1	4 31·4	*Sun.*	8	5·6	5 25·7	Wed.	8	7·2	6 41·4
Sat.	9	6·1	5 33·3	Mon.	9	6·6	6 19·4	Thur.	9	8·2	7 27·2
Sun.	10	7·1	6 33·2	Tues.	10	7·6	7 9·4	Fri.	10	9·2	8 13·5
Mon.	11	8·1	7 29·8	Wed.	11	8·6	7 56·8	Sat.	11	10·2	9 1·3
Tues.	12	9·1	8 22·6	Thur.	12	9·6	8 42·9	*Sun.*	12	11·2	9 51·2
Wed.	13	10·1	9 12·3	Fri.	13	10·6	9 29·0	Mon.	13	12·2	10 43·1
Thur.	14	11·1	10 0·1	Sat.	14	11·6	10 16·3	Tues.	14	13·2	11 36·2
Fri.	15	12·1	10 47·2	*Sun.*	15	12·6	11 5·5	Wed.	15	14·2	12 29·2
Sat.	16	13·1	11 34·6	Mon.	16	13·6	11 56·8	Thur.	16	15·2	13 20·7
Sun.	17	14·1	12 23·4	Tues.	17	14·6	12 49·9	Fri.	17	16·2	14 9·6
Mon.	18	15·1	13 14·1	Wed.	18	15·6	13 43·5	Sat.	18	17·2	14 55·6
Tues.	19	16·1	14 6·5	Thur.	19	16·6	14 36·3	*Sun.*	19	18·2	15 38·9
Wed.	20	17·1	15 0·0	Fri.	20	17·6	15 27·0	Mon.	20	19·2	16 20·2
Thur.	21	18·1	15 53·3	Sat.	21	18·6	16 14·9	Tues.	21	20·2	17 0·5
Fri.	22	19·1	16 45·1	*Sun.*	22	19·6	16 59·9	Wed.	22	21·2	17 40·7
Sat.	23	20·1	17 34·6	Mon.	23	20·6	17 42·6	Thur.	23	22·2	18 22·3
Sun.	24	21·1	18 21·3	Tues.	24	21·6	18 23·8	Fri.	24	23·2	19 6·5
Mon.	25	22·1	19 5·6	Wed.	25	22·6	19 4·5	Sat.	25	24·2	19 54·6
Tues.	26	23·1	19 47·9	Thur.	26	23·6	19 46·0	*Sun.*	26	25·2	20 48·1
Wed.	27	24·1	20 29·3	Fri.	27	24·6	20 29·5	Mon.	27	26·2	21 47·2
Thur.	28	25·1	21 10·9	Sat.	28	25·6	21 16·4	Tues.	28	27·2	22 51·1
Fri.	29	26·1	21 53·7	*Sun.*	29	26·6	22 7·9	Wed.	29	28·2	23 57·1
Sat.	30	27·1	22 39·1	Mon.	30	27·6	23 4·9	Thur.	30	29·2	☌
Sun.	31	28·1	23 28·2	Tues.	31	28·6	☌	Fri.	31	0·9	1 1·7
				Wed.	32	0·2	0 6·8				

1859. AT GREENWICH MEAN NOON. 1859.

JULY.				AUGUST.				SEPTEMBER.			
Day of the Week.	Day of the Month.	THE MOON'S Age. *Noon.*	THE MOON'S Meridian Passage.	Day of the Week.	Day of the Month.	THE MOON'S Age. *Noon.*	THE MOON'S Meridian Passage.	Day of the Week.	Day of the Month.	THE MOON'S Age. *Noon.*	THE MOON'S Meridian Passage.
		d.	h. m.			d.	h. m.			d.	h. m.
Fri.	1	0·9	1 1·7	Mon.	1	2·6	2 28·7	Thur.	1	4·3	3 35·6
Sat.	2	1·9	2 2·3	Tues.	2	3·6	3 17·8	Fri.	2	5·3	4 27·7
Sun.	3	2·9	2 58·1	Wed.	3	4·6	4 6·0	Sat.	3	6·3	5 20·8
Mon.	4	3·9	3 49·5	Thur.	4	5·6	4 54·5	*Sun.*	4	7·3	6 14·4
Tues.	5	4·9	4 38·0	Fri.	5	6·6	5 44·1	Mon.	5	8·3	7 7·3
Wed.	6	5·9	5 24·8	Sat.	6	7·6	6 35·2	Tues.	6	9·3	7 58·4
Thur.	7	6·9	6 11·4	*Sun.*	7	8·6	7 27·5	Wed.	7	10·3	8 46·9
Fri.	8	7·9	6 59·0	Mon.	8	9·6	8 20·3	Thur.	8	11·3	9 32·7
Sat.	9	8·9	7 48·2	Tues.	9	10·6	9 12·3	Fri.	9	12·3	10 16·1
Sun.	10	9·9	8 39·2	Wed.	10	11·6	10 2·5	Sat.	10	13·3	10 57·6
Mon.	11	10·9	9 31·6	Thur.	11	12·6	10 50·2	*Sun.*	11	14·3	11 37·9
Tues.	12	11·9	10 24·3	Fri.	12	13·6	11 35·2	Mon.	12	15·3	12 18·2
Wed.	13	12·9	11 16·1	Sat.	13	14·6	12 17·8	Tues.	13	16·3	12 59·3
Thur.	14	13·9	12 5·8	*Sun.*	14	15·6	12 58·6	Wed.	14	17·3	13 42·3
Fri.	15	14·9	12 52·7	Mon.	15	16·6	13 38·5	Thur.	15	18·3	14 28·2
Sat.	16	15·9	13 36·8	Tues.	16	17·6	14 18·6	Fri.	16	19·3	15 17·9
Sun.	17	16·9	14 18·6	Wed.	17	18·6	14 59·8	Sat.	17	20·3	16 11·9
Mon.	18	17·9	14 58·9	Thur.	18	19·6	15 43·3	*Sun.*	18	21·3	17 9·7
Tues.	19	18·9	15 38·7	Fri.	19	20·6	16 30·2	Mon.	19	22·3	18 10·0
Wed.	20	19·9	16 19·0	Sat.	20	21·6	17 21·6	Tues.	20	23·3	19 10·7
Thur.	21	20·9	17 1·2	*Sun.*	21	22·6	18 17·9	Wed.	21	24·3	20 9·8
Fri.	22	21·9	17 46·4	Mon.	22	23·6	19 18·4	Thur.	22	25·3	21 6·2
Sat.	23	22·9	18 35·9	Tues.	23	24·6	20 21·2	Fri.	23	26·3	21 59·7
Sun.	24	23·9	19 30·8	Wed.	24	25·6	21 23·8	Sat.	24	27·3	22 51·0
Mon.	25	24·9	20 31·0	Thur.	25	26·6	22 24·0	*Sun.*	25	28·3	23 41·2
Tues.	26	25·9	21 35·1	Fri.	26	27·6	23 20·7	Mon.	26	29·3	☌
Wed.	27	26·9	22 40·2	Sat.	27	28·6	☌	Tues.	27	0·9	0 31·5
Thur.	28	27·9	23 43·3	*Sun.*	28	0·3	0 14·1	Wed.	28	1·9	1 22·7
Fri.	29	28·9	☌	Mon.	29	1·3	1 5·2	Thur.	29	2·9	2 15·4
Sat.	30	0·6	0 42·5	Tues.	30	2·3	1 55·1	Fri.	30	3·9	3 9·5
Sun.	31	1·6	1 37·4	Wed.	31	3·3	2 44·9	Sat.	31	4·9	4 4·4
Mon.	32	2·6	2 28·7	Thur.	32	4·3	3 35·6				

1859. AT GREENWICH MEAN NOON. 1859.

OCTOBER.

Day of the Week.	Day of the Month.	The Moon's Age. Noon.	The Moon's Meridian Passage.
		d.	h. m.
Sat.	1	4·9	4 4·4
Sun.	2	5·9	4 58·8
Mon.	3	6·9	5 51·5
Tues.	4	7·9	6 41·4
Wed.	5	8·9	7 28·3
Thur.	6	9·9	8 12·5
Fri.	7	10·9	8 54·6
Sat.	8	11·9	9 35·3
Sun.	9	12·9	10 15·7
Mon.	10	13·9	10 56·8
Tues.	11	14·9	11 39·6
Wed.	12	15·9	12 25·2
Thur.	13	16·9	13 14·4
Fri.	14	17·9	14 7·7
Sat.	15	18·9	15 4·8
Sun.	16	19·9	16 4·4
Mon.	17	20·9	17 4·3
Tues.	18	21·9	18 2·7
Wed.	19	22·9	18 58·3
Thur.	20	23·9	19 51·0
Fri.	21	24·9	20 41·3
Sat.	22	25·9	21 30·4
Sun.	23	26·9	22 19·4
Mon.	24	27·9	23 9·5
Tues.	25	28·9	☌
Wed.	26	0·5	0 1·4
Thur.	27	1·5	0 55·4
Fri.	28	2·5	1 50·9
Sat.	29	3·5	2 46·7
Sun.	30	4·5	3 41·1
Mon.	31	5·5	4 33·0
Tues.	32	6·5	5 21·6

NOVEMBER.

Day of the Week.	Day of the Month.	The Moon's Age. Noon.	The Moon's Meridian Passage.
		d.	h. m.
Tues.	1	6·5	5 21·6
Wed.	2	7·5	6 7·0
Thur.	3	8·5	6 49·8
Fri.	4	9·5	7 30·7
Sat.	5	10·5	8 11·0
Sun.	6	11·5	8 51·6
Mon.	7	12·5	9 33·6
Tues.	8	13·5	10 18·3
Wed.	9	14·5	11 6·8
Thur.	10	15·5	11 59·6
Fri.	11	16·5	12 56·7
Sat.	12	17·5	13 57·0
Sun.	13	18·5	14 58·2
Mon.	14	19·5	15 58·0
Tues.	15	20·5	16 54·5
Wed.	16	21·5	17 47·5
Thur.	17	22·5	18 37·5
Fri.	18	23·5	19 25·6
Sat.	19	24·5	20 13·2
Sun.	20	25·5	21 1·3
Mon.	21	26·5	21 51·2
Tues.	22	27·5	22 43·5
Wed.	23	28·5	23 37·9
Thur.	24	29·5	☌
Fri.	25	0·9	0 33·7
Sat.	26	1·9	1 29·2
Sun.	27	2·9	2 22·8
Mon.	28	3·9	3 13·3
Tues.	29	4·9	4 0·3
Wed.	30	5·9	4 44·1
Thur.	31	6·9	5 25·6

DECEMBER.

Day of the Week.	Day of the Month.	The Moon's Age. Noon.	The Moon's Meridian Passage.
		d.	h. m.
Thur.	1	6·9	5 25·6
Fri.	2	7·9	6 5·7
Sat.	3	8·9	6 45·5
Sun.	4	9·9	7 26·3
Mon.	5	10·9	8 9·1
Tues.	6	11·9	8 55·4
Wed.	7	12·9	9 46·2
Thur.	8	13·9	10 42·0
Fri.	9	14·9	11 42·3
Sat.	10	15·9	12 45·0
Sun.	11	16·9	13 47·5
Mon.	12	17·9	14 47·2
Tues.	13	18·9	15 42·9
Wed.	14	19·9	16 34·7
Thur.	15	20·9	17 23·7
Fri.	16	21·9	18 11·2
Sat.	17	22·9	18 58·6
Sun.	18	23·9	19 47·0
Mon.	19	24·9	20 37·3
Tues.	20	25·9	21 29·9
Wed.	21	26·9	22 24·4
Thur.	22	27·9	23 19·5
Fri.	23	28·9	☌
Sat.	24	0·3	0 13·6
Sun.	25	1·3	1 5·3
Mon.	26	2·3	1 53·8
Tues.	27	3·3	2 39·0
Wed.	28	4·3	3 21·3
Thur.	29	5·3	4 1·7
Fri.	30	6·3	4 41·2
Sat.	31	7·3	5 20·8
Sun.	32	8·3	6 1·7

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Spica	W.	49 2 21	50 31 59	52 1 31	53 30 59
	Sun	E.	30 3 48	28 42 28	27 21 18	26 0 17
6	Sun	W.	24 37 31	25 58 3	27 18 43	28 39 32
	α Pegasi	E.	45 40 30	44 19 48	42 59 29	41 39 35
	α Arietis	E.	85 47 36	84 18 52	82 50 4	81 21 13
7	Sun	W.	35 25 30	36 47 4	38 8 46	39 30 36
	α Pegasi	E.	35 8 19	33 52 12	32 37 1	31 22 52
	α Arietis	E.	73 55 54	72 26 37	70 57 13	69 27 45
	Aldebaran	E.	105 32 8	104 4 4	102 35 53	101 7 34
	Jupiter	E.	110 46 30	109 16 34	107 46 33	106 16 25
8	Sun	W.	46 21 49	47 44 30	49 7 21	50 30 22
	α Arietis	E.	61 58 45	60 28 36	58 58 19	57 27 54
	Aldebaran	E.	93 44 9	92 15 4	90 45 50	89 16 27
	Jupiter	E.	98 43 59	97 13 6	95 42 5	94 10 55
9	Sun	W.	57 28 6	58 52 13	60 16 33	61 41 7
	α Arietis	E.	49 53 38	48 22 19	46 50 50	45 19 10
	Aldebaran	E.	81 47 7	80 16 45	78 46 11	77 15 26
	Jupiter	E.	86 32 35	85 0 23	83 27 59	81 55 22
10	Sun	W.	68 47 21	70 13 21	71 39 38	73 6 10
	Fomalhaut	W.	35 12 27	36 26 13	37 41 28	38 58 6
	α Arietis	E.	37 38 13	36 5 29	34 32 35	32 59 30
	Aldebaran	E.	69 38 44	68 6 46	66 34 35	65 2 11
	Jupiter	E.	74 9 5	72 35 8	71 0 55	69 26 27
11	Sun	W.	80 23 18	81 51 39	83 20 21	84 49 22
	Fomalhaut	W.	45 39 7	47 2 24	48 26 34	49 51 36
	Mars	W.	26 47 10	28 17 24	29 48 0	31 18 56
	α Pegasi	W.	24 58 29	26 7 37	27 19 33	28 33 58
	Aldebaran	E.	57 16 46	55 43 0	54 9 0	52 34 47
	Jupiter	E.	61 29 59	59 53 50	58 17 22	56 40 37
	Saturn	E.	119 0 57	117 24 16	115 47 15	114 9 53
12	Sun	W.	92 19 48	93 51 0	95 22 36	96 54 34
	Fomalhaut	W.	57 8 24	58 37 54	60 8 3	61 38 51
	Mars	W.	38 59 7	40 32 18	42 5 51	43 39 49
	α Pegasi	W.	35 15 44	36 40 51	38 7 16	39 34 54
	Aldebaran	E.	44 40 32	43 5 8	41 29 35	39 53 54
	Jupiter	E.	48 32 1	46 53 19	45 14 18	43 34 56
	Pollux	E.	86 39 23	85 0 35	83 21 25	81 41 51
	Saturn	E.	105 57 50	104 18 19	102 38 24	100 58 7
13	Sun	W.	104 40 29	106 14 55	107 49 46	109 25 2
	Fomalhaut	W.	69 21 57	70 56 18	72 31 11	74 6 36
	Mars	W.	51 35 45	53 12 12	54 49 4	56 26 22
	α Pegasi	W.	47 8 41	48 42 11	50 16 30	51 51 36
	Jupiter	E.	35 13 20	33 32 7	31 50 37	30 8 52
	Pollux	E.	73 18 0	71 36 0	69 53 35	68 10 45
	Saturn	E.	92 30 34	90 47 49	89 4 38	87 21 2
	Regulus	E.	110 11 31	108 29 20	106 46 42	105 3 40

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Spica	W.	55 0 23	56 29 42	57 58 57	59 28 9
	Sun	E.	24 39 26	23 18 45	21 58 16	20 37 59
6	Sun	W.	30 0 28	31 21 32	32 42 44	34 4 3
	a Pegasi	E.	40 20 9	39 1 15	37 42 55	36 25 15
	a Arietis	E.	79 52 18	78 23 19	76 54 15	75 25 7
7	Sun	W.	40 52 34	42 14 40	43 36 54	44 59 17
	a Pegasi	E.	30 9 55	28 58 20	27 48 17	26 40 0
	a Arietis	E.	67 58 10	66 28 29	64 58 41	63 28 46
	Aldebaran	E.	99 39 9	98 10 36	96 41 55	95 13 6
	Jupiter	E.	104 46 11	103 15 49	101 45 20	100 14 44
8	Sun	W.	51 53 32	53 16 54	54 40 26	56 4 10
	a Arietis	E.	55 57 21	54 26 39	52 55 48	51 24 48
	Aldebaran	E.	87 46 55	86 17 13	84 47 21	83 17 19
	Jupiter	E.	92 39 35	91 8 6	89 36 26	88 4 36
9	Sun	W.	63 5 53	64 30 53	65 56 8	67 21 37
	a Arietis	E.	43 47 20	42 15 19	40 43 8	39 10 46
	Aldebaran	E.	75 44 30	74 13 22	72 42 2	71 10 29
	Jupiter	E.	80 22 34	78 49 32	77 16 17	75 42 48
10	Sun	W.	74 33 0	76 0 7	77 27 32	78 55 15
	Fomalhaut	W.	40 16 3	41 35 11	42 55 27	44 16 47
	a Arietis	E.	31 26 15	29 52 51	28 19 19	26 45 41
	Aldebaran	E.	63 29 33	61 56 42	60 23 37	58 50 18
	Jupiter	E.	67 51 42	66 16 42	64 41 25	63 5 51
11	Sun	W.	86 18 44	87 48 28	89 18 33	90 48 59
	Fomalhaut	W.	51 17 27	52 44 5	54 11 28	55 39 35
	Mars	W.	32 50 14	34 21 54	35 53 55	37 26 20
	a Pegasi	W.	29 50 37	31 9 18	32 29 49	33 52 1
	Aldebaran	E.	51 0 21	49 25 41	47 50 50	46 15 46
	Jupiter	E.	55 3 32	53 26 8	51 48 25	50 10 23
	Saturn	E.	112 32 12	110 54 9	109 15 45	107 36 58
12	Sun	W.	98 26 56	99 59 43	101 32 53	103 6 29
	Fomalhaut	W.	63 10 17	64 42 19	66 14 58	67 48 10
	Mars	W.	45 14 11	46 48 58	48 24 9	49 59 44
	a Pegasi	W.	41 3 39	42 33 28	44 4 17	45 36 2
	Aldebaran	E.	38 18 8	36 42 19	35 6 29	33 30 42
	Jupiter	E.	41 55 15	40 15 14	38 34 55	36 54 17
	Pollux	E.	80 1 53	78 21 31	76 40 45	74 59 35
	Saturn	E.	99 17 25	97 36 19	95 54 49	94 12 54
13	Sun	W.	111 0 44	112 36 52	114 13 25	115 50 25
	Fomalhaut	W.	75 42 33	77 19 0	78 55 58	80 33 24
	Mars	W.	58 4 6	59 42 15	61 20 51	62 59 53
	a Pegasi	W.	53 27 26	55 4 1	56 41 17	58 19 13
	Jupiter	E.	28 26 54	26 44 46	25 2 31	23 20 12
	Pollux	E.	66 27 30	64 43 48	62 59 41	61 15 9
	Saturn	E.	85 37 0	83 52 32	82 7 38	80 22 19
	Regulus	E.	103 20 11	101 36 17	99 51 56	98 7 10

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
14	Sun	W.	117° 27′ 50″	119° 5′ 41″	120° 43′ 58″	122° 22′ 40″
	Fomalhaut	W.	82 11 19	83 49 42	85 28 31	87 7 47
	Mars	W.	64 39 21	66 19 16	67 59 36	69 40 22
	a Pegasi	W.	59 57 49	61 37 3	63 16 53	64 57 19
	Pollux	E.	59 30 12	57 44 49	55 59 0	54 12 47
	Saturn	E.	78 36 33	76 50 21	75 3 43	73 16 39
	Regulus	E.	96 21 57	94 36 19	92 50 14	91 3 44
15	Mars	W.	78 10 35	79 53 52	81 37 33	83 21 37
	a Pegasi	W.	73 27 44	75 11 20	76 55 25	78 39 57
	a Arietis	W.	30 11 53	31 59 12	33 47 4	35 35 28
	Pollux	E.	45 15 33	43 26 56	41 37 57	39 48 36
	Saturn	E.	64 14 58	62 25 23	60 35 25	58 45 3
	Regulus	E.	82 4 51	80 15 50	78 26 26	76 36 38
16	Mars	W.	92 7 29	93 53 41	95 40 12	97 27 0
	a Arietis	W.	44 44 25	46 35 27	48 26 51	50 18 35
	Aldebaran	W.	16 23 2	17 50 12	19 21 45	20 56 48
	Pollux	E.	30 37 5	28 45 58	26 54 38	25 3 9
	Saturn	E.	49 27 43	47 35 13	45 42 25	43 49 19
	Regulus	E.	67 22 5	65 30 9	63 37 54	61 45 21
17	*a* Arietis	W.	59 41 44	61 35 6	63 28 40	65 22 25
	Aldebaran	W.	29 25 31	31 11 37	32 58 40	34 46 33
	Jupiter	W.	23 56 45	25 48 6	27 40 2	29 32 26
	Saturn	E.	34 19 58	32 25 27	30 30 45	28 35 55
	Regulus	E.	52 18 44	50 24 44	48 30 35	46 36 15
	Spica	E.	106 20 4	104 26 10	102 32 5	100 37 50
18	*a* Arietis	W.	74 52 59	76 47 19	78 41 39	80 35 59
	Aldebaran	W.	43 54 41	45 45 31	47 36 36	49 27 53
	Jupiter	W.	38 59 10	40 53 6	42 47 9	44 41 16
	Regulus	E.	37 3 2	35 8 13	33 13 23	31 18 34
	Spica	E.	91 4 58	89 10 13	87 15 28	85 20 43
19	*a* Arietis	W.	90 6 46	92 0 36	93 54 15	95 47 43
	Aldebaran	W.	58 45 53	60 37 31	62 29 6	64 20 35
	Jupiter	W.	54 11 50	56 5 44	57 59 30	59 53 8
	Pollux	W.	15 32 37	17 24 19	19 16 22	21 8 35
	Spica	E.	75 47 57	73 53 45	71 59 43	70 5 51
20	Aldebaran	W.	73 35 37	75 25 58	77 16 3	79 5 51
	Jupiter	W.	69 18 7	71 10 21	73 2 18	74 53 55
	Pollux	W.	30 29 18	32 21 0	34 12 28	36 3 39
	Spica	E.	60 40 4	58 47 43	56 55 42	55 4 0
	Antares	E.	106 32 11	104 39 45	102 47 38	100 55 50
	Venus	E.	117 58 23	116 12 22	114 26 36	112 41 7
21	Aldebaran	W.	88 9 50	89 57 31	91 44 48	93 31 40
	Jupiter	W.	84 6 47	85 56 12	87 45 13	89 33 49
	Pollux	W.	45 14 58	47 4 10	48 52 59	50 41 24
	Saturn	W.	26 32 56	28 23 1	30 12 43	32 2 1
	Spica	E.	45 50 58	44 1 33	42 12 32	40 23 58

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
14	Sun	W.	124 1 48	125 41 21	127 21 20	129 1 42
	Fomalhaut	W.	88 47 28	90 27 33	92 8 2	93 48 53
	Mars	W.	71 21 34	73 3 11	74 45 14	76 27 42
	α Pegasi	W.	66 38 19	68 19 53	70 1 59	71 44 36
	Pollux	E.	52 26 8	50 39 5	48 51 38	47 3 47
	Saturn	E.	71 29 9	69 41 14	67 52 53	66 4 8
	Regulus	E.	89 16 48	87 29 27	85 41 40	83 53 28
15	Mars	W.	85 6 4	86 50 54	88 36 5	90 21 37
	α Pegasi	W.	80 24 54	82 10 16	83 56 1	85 42 9
	α Arietis	W.	37 24 21	39 13 43	41 3 32	42 53 46
	Pollux	E.	37 58 55	36 8 54	34 18 34	32 27 58
	Saturn	E.	56 54 18	55 3 11	53 11 42	51 19 53
	Regulus	E.	74 46 27	72 55 53	71 4 58	69 13 42
16	Mars	W.	99 14 5	101 1 27	102 49 2	104 36 52
	α Arietis	W.	52 10 39	54 3 1	55 55 40	57 48 35
	Aldebaran	W.	22 34 40	24 14 50	25 56 53	27 40 32
	Pollux	E.	23 11 32	21 19 51	19 28 11	17 36 39
	Saturn	E.	41 55 57	40 2 18	38 8 25	36 14 18
	Regulus	E.	59 52 32	57 59 26	56 6 6	54 12 31
17	α Arietis	W.	67 16 19	69 10 20	71 4 28	72 58 42
	Aldebaran	W.	36 35 9	38 24 20	40 14 2	42 4 10
	Jupiter	W.	31 25 13	33 18 20	35 11 44	37 5 21
	Saturn	E.	26 40 57	24 45 53	32 50 44	20 55 31
	Regulus	E.	44 41 48	42 47 14	40 52 34	38 57 49
	Spica	E.	98 43 27	96 48 57	94 54 21	92 59 41
18	α Arietis	W.	82 30 18	84 24 33	86 18 44	88 12 49
	Aldebaran	W.	51 19 20	53 10 53	55 2 32	56 54 12
	Jupiter	W.	46 35 26	48 29 36	50 23 44	52 17 49
	Regulus	E.	29 23 47	27 29 3	25 34 25	23 39 52
	Spica	E.	83 26 0	81 31 21	79 36 46	77 42 18
19	α Arietis	W.	97 40 59	99 34 1	101 26 49	103 19 20
	Aldebaran	W.	66 11 56	68 3 9	69 54 11	71 45 1
	Jupiter	W.	61 46 34	63 39 48	65 32 50	67 25 36
	Pollux	W.	23 0 51	24 53 8	26 45 20	28 37 24
	Spica	E.	68 12 13	66 18 47	64 25 37	62 32 42
20	Aldebaran	W.	80 55 20	82 44 29	84 33 18	86 21 45
	Jupiter	W.	76 45 13	78 36 9	80 26 44	82 16 57
	Pollux	W.	37 54 34	39 45 11	41 35 28	43 25 24
	Spica	E.	53 12 39	51 21 40	49 31 2	47 40 49
	Antares	E.	99 4 23	97 13 16	95 22 32	93 32 11
	Venus	E.	110 55 56	109 11 4	107 26 32	105 42 22
21	Aldebaran	W.	95 18 7	97 4 7	98 49 41	100 34 47
	Jupiter	W.	91 22 0	93 9 44	94 57 2	96 43 53
	Pollux	W.	52 29 24	54 17 0	56 4 10	57 50 54
	Saturn	W.	33 50 53	35 39 19	37 27 20	39 14 54
	Spica	E.	38 35 49	36 48 7	35 0 53	33 14 7

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
21	Antares	E.	91 42 12	89 52 38	88 3 29	86 14 44
	Venus	E.	103 58 35	102 15 10	100 32 8	98 49 32
22	Jupiter	W.	98 30 16	100 16 12	102 1 41	103 46 42
	Pollux	W.	59 37 12	61 23 3	63 8 28	64 53 25
	Saturn	W.	41 2 1	42 48 41	44 34 54	46 20 40
	Regulus	W.	22 38 8	24 24 14	26 9 52	27 55 3
	Antares	E.	77 17 33	75 31 27	73 45 49	72 0 38
	Venus	E.	90 23 0	88 43 4	87 3 35	85 24 34
	Sun	E.	131 34 33	129 56 14	128 18 21	126 40 55
23	Pollux	W.	73 31 26	75 13 41	76 55 29	78 36 50
	Saturn	W.	55 2 38	56 45 40	58 28 14	60 10 22
	Regulus	W.	36 34 6	38 16 32	39 58 31	41 40 4
	Antares	E.	63 21 36	61 39 10	59 57 11	58 15 39
	Venus	E.	77 16 43	75 40 36	74 4 57	72 29 48
	Sun	E.	118 40 33	117 5 49	115 31 33	113 57 43
24	Pollux	W.	86 57 2	88 35 48	90 14 9	91 52 5
	Saturn	W.	68 34 24	70 13 56	71 53 3	73 31 45
	Regulus	W.	50 1 9	51 40 5	53 18 36	54 56 43
	Antares	E.	49 54 36	48 15 41	46 37 10	44 59 4
	Venus	E.	64 41 12	63 8 55	61 37 5	60 5 43
	Sun	E.	106 15 6	104 43 51	103 13 0	101 42 34
25	Pollux	W.	99 55 56	101 31 35	103 6 53	104 41 51
	Saturn	W.	81 39 26	83 15 52	84 51 56	86 27 40
	Regulus	W.	63 1 26	64 37 15	66 12 44	67 47 51
	Antares	E.	36 54 25	35 18 37	33 43 9	32 8 2
	Venus	E.	52 35 49	51 7 11	49 39 1	48 11 17
	Sun	E.	94 16 12	92 48 3	91 20 14	89 52 46
26	Saturn	W.	94 21 27	95 55 18	97 28 52	99 2 10
	Regulus	W.	75 38 39	77 11 55	78 44 53	80 17 35
	Spica	W.	21 42 28	23 15 17	24 47 53	26 20 15
	Venus	E.	40 59 25	39 34 24	38 9 53	36 45 50
	Sun	E.	82 40 15	81 14 39	79 49 19	78 24 16
27	Saturn	W.	106 44 55	108 16 48	109 48 27	111 19 55
	Regulus	W.	87 57 21	89 28 38	90 59 41	92 30 33
	Spica	W.	33 58 46	35 29 51	37 0 44	38 31 26
	Venus	E.	29 53 30	28 32 48	27 12 48	25 53 32
	Sun	E.	71 22 44	69 59 6	68 35 41	67 12 27
28	Regulus	W.	100 2 15	101 32 7	103 1 51	104 31 28
	Spica	W.	46 2 28	47 32 13	49 1 51	50 31 21
	Sun	E.	60 18 58	58 56 45	57 34 39	56 12 41
29	Spica	W.	57 57 17	59 26 13	60 55 4	62 23 51
	Sun	E.	49 24 30	48 3 8	46 41 51	45 20 38
30	Spica	W.	69 47 4	71 15 36	72 44 7	74 12 38
	Antares	W.	23 53 12	25 21 46	26 50 19	28 18 52
	Sun	E.	38 35 20	37 14 23	35 53 27	34 32 33

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
21	Antares	E.	84 26 25	82 38 32	80 51 6	79 4 6
	Venus	E.	97 7 21	95 25 36	93 44 17	92 3 25
22	Jupiter	W.	105 31 14	107 15 19	108 58 55	110 42 3
	Pollux	W.	66 37 56	68 21 59	70 5 35	71 48 44
	Saturn	W.	48 5 59	49 50 50	51 35 13	53 19 9
	Regulus	W.	29 39 47	31 24 3	33 7 52	34 51 13
	Antares	E.	70 15 54	68 31 38	66 47 50	65 4 29
	Venus	E.	83 46 2	82 7 59	80 30 25	78 53 20
	Sun	E.	125 3 56	123 27 25	121 51 20	120 15 43
23	Pollux	W.	80 17 45	81 58 13	83 38 15	85 17 51
	Saturn	W.	61 52 2	63 33 17	65 14 5	66 54 28
	Regulus	W.	43 21 9	45 1 48	46 42 1	48 21 48
	Antares	E.	56 34 34	54 53 56	53 13 43	51 33 57
	Venus	E.	70 55 7	69 20 55	67 47 13	66 13 58
	Sun	E.	112 24 19	110 51 22	109 18 51	107 46 46
24	Pollux	W.	93 29 38	95 6 47	96 43 32	98 19 56
	Saturn	W.	75 10 3	76 47 58	78 25 30	80 2 39
	Regulus	W.	56 34 26	58 11 45	59 48 41	61 25 14
	Antares	E.	43 21 22	41 44 3	40 7 8	38 30 35
	Venus	E.	58 34 49	57 4 23	55 34 25	54 4 53
	Sun	E.	100 12 32	98 42 53	97 13 37	95 44 44
25	Pollux	W.	106 16 28	107 50 45	109 24 43	110 58 22
	Saturn	W.	88 3 3	89 38 7	91 12 52	92 47 18
	Regulus	W.	69 22 39	70 57 7	72 31 16	74 5 7
	Antares	E.	30 33 16	28 58 49	27 24 42	25 50 53
	Venus	E.	46 44 1	45 17 11	43 50 48	42 24 53
	Sun	E.	88 25 38	86 58 49	85 32 19	84 6 8
26	Saturn	W.	100 35 12	102 8 0	103 40 32	105 12 50
	Regulus	W.	81 50 1	83 22 13	84 54 9	86 25 52
	Spica	W.	27 52 23	29 24 18	30 56 0	32 27 29
	Venus	E.	35 22 17	33 59 15	32 36 46	31 14 50
	Sun	E.	76 59 28	75 34 56	74 10 38	72 46 34
27	Saturn	W.	112 51 11	114 22 17	115 53 13	117 23 59
	Regulus	W.	94 1 14	95 31 44	97 2 4	98 32 14
	Spica	W.	40 1 58	41 32 20	43 2 31	44 32 34
	Venus	E.	24 35 6	23 17 36	22 1 8	20 45 51
	Sun	E.	65 49 25	64 26 34	63 3 52	61 41 21
28	Regulus	W.	106 0 57	107 30 19	108 59 36	110 28 46
	Spica	W.	52 0 44	53 30 1	54 59 12	56 28 17
	Sun	E.	54 50 50	53 29 6	52 7 28	50 45 57
29	Spica	W.	63 52 35	65 21 16	66 49 54	68 18 30
	Sun	E.	43 59 28	42 38 22	41 17 19	39 56 18
30	Spica	W.	75 41 7	77 9 37	78 38 6	80 6 37
	Antares	W.	29 47 25	31 15 57	32 44 29	34 13 2
	Sun	E.	33 11 40	31 50 47	30 29 54	29 9 2

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
5	Sun	W.	27° 7′ 43″	28° 32′ 4″	29° 56′ 35″	31° 21′ 15″
	α Arietis	E.	52 46 26	51 14 59	49 43 25	48 11 45
	Aldebaran	E.	84 39 31	83 9 7	81 38 34	80 7 53
	Jupiter	E.	88 14 3	86 42 27	85 10 43	83 38 51
6	Sun	W.	38 27 2	39 52 42	41 18 34	42 44 36
	α Arietis	E.	40 31 34	38 59 11	37 26 41	35 54 5
	Aldebaran	E.	72 32 27	71 0 58	69 29 20	67 57 33
	Jupiter	E.	75 57 14	74 24 26	72 51 29	71 18 21
	Pollux	E.	115 8 59	113 35 54	112 2 38	110 29 10
7	Sun	W.	49 57 40	51 24 53	52 52 19	54 19 58
	α Pegasi	W.	22 50 33	23 53 3	24 58 54	26 7 43
	Aldebaran	E.	60 16 39	58 44 4	57 11 21	55 38 30
	Jupiter	E.	63 30 7	61 55 55	60 21 32	58 46 58
	Pollux	E.	102 38 59	101 4 20	99 29 29	97 54 25
8	Sun	W.	61 41 39	63 10 43	64 40 2	66 9 37
	α Pegasi	W.	32 26 4	33 47 3	35 9 24	36 33 1
	Mars	W.	15 47 9	17 16 13	18 45 51	20 15 58
	Aldebaran	E.	47 52 33	46 19 4	44 45 31	43 11 54
	Jupiter	E.	50 51 6	49 15 19	47 39 20	46 3 8
	Pollux	E.	89 55 38	88 19 10	86 42 26	85 5 27
	Saturn	E.	107 5 9	105 27 56	103 50 28	102 12 44
9	Sun	W.	73 41 32	75 12 46	76 44 18	78 16 7
	α Pegasi	W.	43 46 52	45 16 17	46 46 29	48 17 23
	Mars	W.	27 52 50	29 25 20	30 58 12	32 31 25
	Aldebaran	E.	35 23 53	33 50 31	32 17 21	30 44 27
	Jupiter	E.	37 59 3	36 21 39	34 44 3	33 6 17
	Pollux	E.	76 56 33	75 17 56	73 39 2	71 59 49
	Saturn	E.	94 0 5	92 20 42	90 41 2	89 1 5
	Regulus	E.	113 50 57	112 12 9	110 33 3	108 53 40
10	Sun	W.	85 59 53	87 33 36	89 7 39	90 42 1
	α Pegasi	W.	56 1 41	57 36 19	59 11 30	60 47 12
	Mars	W.	40 22 43	41 58 2	43 33 41	45 9 41
	Pollux	E.	63 39 15	61 58 12	60 16 50	58 35 9
	Saturn	E.	80 36 39	78 54 48	77 12 38	75 30 8
	Regulus	E.	100 32 5	98 50 48	97 9 12	95 27 16
11	Sun	W.	98 39 0	100 15 25	101 52 12	103 29 19
	α Pegasi	W.	68 53 9	70 31 44	72 10 46	73 50 13
	Mars	W.	53 15 2	54 53 11	56 31 40	58 10 31
	α Arietis	W.	25 28 44	27 10 36	28 53 2	30 36 1
	Pollux	E.	50 1 46	48 18 6	46 34 7	44 49 48
	Saturn	E.	66 52 35	65 8 2	63 23 9	61 37 55
	Regulus	E.	86 52 31	85 8 33	83 24 13	81 39 32
12	Sun	W.	111 40 12	113 19 25	114 58 58	116 38 51
	α Pegasi	W.	82 13 39	83 55 29	85 37 41	87 20 13
	Mars	W.	66 30 7	68 11 5	69 52 24	71 34 3
	α Arietis	W.	39 18 7	41 3 51	42 50 0	44 36 33
	Pollux	E.	36 3 24	34 17 12	32 30 43	30 43 58

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
5	Sun	W.	32 46 4	34 11 4	35 36 13	37 1 32
	α Arietis	E.	46 39 57	45 8 2	43 35 59	42 3 50
	Aldebaran	E.	78 37 4	77 6 7	75 35 2	74 3 49
	Jupiter	E.	82 6 50	80 34 39	79 2 20	77 29 52
6	Sun	W.	44 10 49	45 37 14	47 3 50	48 30 39
	α Arietis	E.	34 21 23	32 48 35	31 15 43	29 42 46
	Aldebaran	E.	66 25 39	64 53 36	63 21 25	61 49 6
	Jupiter	E.	69 45 4	68 11 35	66 37 57	65 4 7
	Pollux	E.	108 55 31	107 21 41	105 47 39	104 13 25
7	Sun	W.	55 47 50	57 15 56	58 44 16	60 12 50
	α Pegasi	W.	27 19 10	28 32 58	29 48 51	31 6 37
	Aldebaran	E.	54 5 32	52 32 27	50 59 15	49 25 57
	Jupiter	E.	57 12 12	55 37 14	54 2 4	52 26 41
	Pollux	E.	96 19 7	94 43 36	93 7 51	91 31 52
8	Sun	W.	67 39 27	69 9 33	70 39 56	72 10 35
	α Pegasi	W.	37 57 48	39 23 39	40 50 29	42 18 15
	Mars	W.	21 46 32	23 17 31	24 48 55	26 20 41
	Aldebaran	E.	41 38 16	40 4 36	38 30 58	36 57 23
	Jupiter	E.	44 26 44	42 50 7	41 13 18	39 36 16
	Pollux	E.	83 28 13	81 50 43	80 12 56	78 34 53
	Saturn	E.	100 34 45	98 56 30	97 17 58	95 39 10
9	Sun	W.	79 48 15	81 20 41	82 53 26	84 26 30
	α Pegasi	W.	49 48 59	51 21 14	52 54 7	54 27 37
	Mars	W.	34 4 59	35 38 53	37 13 9	38 47 46
	Aldebaran	E.	29 11 55	27 39 51	26 8 24	24 37 44
	Jupiter	E.	31 28 22	29 50 19	28 12 10	26 33 56
	Pollux	E.	70 20 19	68 40 31	67 0 25	65 19 59
	Saturn	E.	87 20 49	85 40 14	83 59 21	82 18 10
	Regulus	E.	107 13 58	105 33 58	103 53 39	102 13 2
10	Sun	W.	92 16 44	93 51 47	95 27 11	97 2 55
	α Pegasi	W.	62 23 25	64 0 8	65 37 20	67 15 0
	Mars	W.	46 46 3	48 22 46	49 59 50	51 37 16
	Pollux	E.	56 53 7	55 10 47	53 28 6	51 45 6
	Saturn	E.	73 47 18	72 4 8	70 20 37	68 36 46
	Regulus	E.	93 45 0	92 2 24	90 19 27	88 36 9
11	Sun	W.	105 6 48	106 44 38	108 22 48	110 1 20
	α Pegasi	W.	75 30 6	77 10 24	78 51 6	80 32 11
	Mars	W.	59 49 44	61 29 18	63 9 13	64 49 29
	α Arietis	W.	32 19 30	34 3 28	35 47 55	37 32 48
	Pollux	E.	43 5 9	41 20 11	39 34 54	37 49 18
	Saturn	E.	59 52 21	58 6 25	56 20 8	54 33 31
	Regulus	E.	79 54 31	78 9 8	76 23 25	74 37 21
12	Sun	W.	118 19 5	119 59 38	121 40 31	123 21 43
	α Pegasi	W.	89 3 5	90 46 16	92 29 45	94 13 32
	Mars	W.	73 16 3	74 58 22	76 41 1	78 23 59
	α Arietis	W.	46 23 28	48 10 47	49 58 27	51 46 28
	Pollux	E.	28 56 58	27 9 44	25 22 17	23 34 40

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
12	Saturn	E.	52 46 33	50 59 15	49 11 37	47 23 38
	Regulus	E.	72 50 56	71 4 10	69 17 4	67 29 38
13	Sun	W.	125 3 13	126 45 2	128 27 9	130 9 33
	Mars	W.	80 7 16	81 50 51	83 34 44	85 18 54
	α Arietis	W.	53 34 50	55 23 32	57 12 33	59 1 54
	Aldebaran	W.	23 51 38	25 29 34	27 9 6	28 50 2
	Jupiter	W.	18 30 30	20 14 51	22 0 14	23 46 28
	Saturn	E.	38 18 55	36 29 3	34 38 54	32 48 27
	Regulus	E.	58 27 33	56 38 12	54 48 33	52 58 37
	Spica	E.	112 28 37	110 39 21	108 49 47	106 59 56
14	Mars	W.	94 3 43	95 49 24	97 35 16	99 21 21
	α Arietis	W.	68 12 49	70 3 46	71 54 56	73 46 18
	Aldebaran	W.	37 30 12	39 16 32	41 3 28	42 50 54
	Jupiter	W.	32 47 0	34 36 30	36 26 21	38 16 32
	Regulus	E.	43 44 58	41 53 31	40 1 51	38 10 0
	Spica	E.	97 46 41	95 55 18	94 3 44	92 11 57
15	Mars	W.	108 14 6	110 1 1	111 48 0	113 35 3
	α Arietis	W.	83 5 41	84 57 57	86 50 19	88 42 44
	Aldebaran	W.	51 54 16	53 43 52	55 33 42	57 23 44
	Jupiter	W.	47 31 13	49 22 44	51 14 23	53 6 8
	Regulus	E.	28 48 19	26 55 36	25 2 49	23 9 57
	Spica	E.	82 50 38	80 58 0	79 5 17	77 12 30
16	α Arietis	W.	98 5 13	99 57 40	101 50 2	103 42 19
	Aldebaran	W.	66 35 46	68 26 22	70 16 57	72 7 30
	Jupiter	W.	62 25 47	64 17 44	66 9 38	68 1 29
	Pollux	W.	23 24 50	25 16 33	27 8 22	29 0 13
	Spica	E.	67 48 12	65 55 24	64 2 40	62 10 1
	Antares	E.	113 40 39	111 47 46	109 54 56	108 2 12
17	Aldebaran	W.	81 19 4	83 8 58	84 58 40	86 48 10
	Jupiter	W.	77 19 2	79 10 4	81 0 54	82 51 30
	Pollux	W.	38 18 52	40 10 15	42 1 29	43 52 31
	Saturn	W.	21 44 32	23 36 49	25 28 54	27 20 47
	Spica	E.	52 48 39	50 56 54	49 5 22	47 14 3
	Antares	E.	98 40 19	96 48 27	94 56 47	93 5 20
18	Aldebaran	W.	95 51 53	97 39 44	99 27 14	101 14 24
	Jupiter	W.	92 0 41	93 49 38	95 38 14	97 26 31
	Pollux	W.	53 4 8	54 53 38	56 42 48	58 31 40
	Saturn	W.	36 36 28	38 26 45	40 16 41	42 6 18
	Regulus	W.	16 3 54	17 53 40	19 43 7	21 32 13
	Spica	E.	38 1 33	36 11 58	34 22 45	32 33 53
	Antares	E.	83 52 0	82 2 13	80 12 46	78 23 39
	Venus	E.	118 54 48	117 13 25	115 32 21	113 51 34
19	Jupiter	W.	106 22 17	108 8 15	109 53 47	111 38 55
	Pollux	W.	67 30 35	69 17 14	71 3 29	72 49 19
	Saturn	W.	51 8 54	52 56 15	54 43 13	56 29 46
	Regulus	W.	30 32 18	32 19 9	34 5 36	35 51 38
	Spica	E.	23 35 32	21 49 11	20 3 20	18 17 59

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
12	Saturn	E.	45° 35′ 20″	43° 46′ 42″	41° 57′ 45″	40° 8′ 29″
	Regulus	E.	65 41 52	63 53 46	62 5 21	60 16 36
13	Sun	W.	131 52 13	133 35 10	135 18 23	137 1 50
	Mars	W.	87 3 21	88 48 4	90 33 2	92 18 16
	α Arietis	W.	60 51 32	62 41 27	64 31 39	66 22 7
	Aldebaran	W.	30 32 12	32 15 24	33 59 32	35 44 30
	Jupiter	W.	25 33 27	27 21 4	29 9 14	30 57 53
	Saturn	E.	30 57 45	29 6 47	27 15 34	25 24 7
	Regulus	E.	51 8 24	49 17 55	47 27 11	45 36 11
	Spica	E.	105 9 48	103 19 24	101 28 44	99 37 50
14	Mars	W.	101 7 36	102 54 2	104 40 35	106 27 17
	α Arietis	W.	75 37 52	77 29 36	79 21 30	81 13 32
	Aldebaran	W.	44 38 49	46 27 10	48 15 52	50 4 55
	Jupiter	W.	40 7 0	41 57 44	43 48 42	45 39 52
	Regulus	E.	36 17 58	34 25 46	32 33 25	30 40 55
	Spica	E.	90 19 59	88 27 52	86 35 35	84 43 10
15	Mars	W.	115 22 8	117 9 15	118 56 22	120 43 28
	α Arietis	W.	90 35 12	92 27 43	94 20 14	96 12 44
	Aldebaran	W.	59 13 56	61 4 16	62 54 42	64 45 13
	Jupiter	W.	54 57 59	56 49 53	58 41 50	60 33 49
	Regulus	E.	21 17 3	19 24 6	17 31 9	15 38 13
	Spica	E.	75 19 40	73 26 48	71 33 55	69 41 3
16	α Arietis	W.	105 34 30	107 26 33	109 18 27	111 10 12
	Aldebaran	W.	73 58 1	75 48 27	77 38 47	79 29 0
	Jupiter	W.	69 53 15	71 44 54	73 36 26	75 27 49
	Pollux	W.	30 52 5	32 43 54	34 35 39	36 27 19
	Spica	E.	60 17 28	58 25 2	56 32 45	54 40 37
	Antares	E.	106 9 33	104 17 1	102 24 38	100 32 23
17	Aldebaran	W.	88 37 27	90 26 28	92 15 14	94 3 43
	Jupiter	W.	84 41 52	86 32 0	88 21 51	90 11 25
	Pollux	W.	45 43 20	47 33 55	49 24 16	51 14 21
	Saturn	W.	29 12 27	31 3 52	32 55 1	34 45 54
	Spica	E.	45 23 0	43 32 11	41 41 40	39 51 27
	Antares	E.	91 14 8	89 23 10	87 32 29	85 42 6
18	Aldebaran	W.	103 1 11	104 47 35	106 33 35	108 19 10
	Jupiter	W.	99 14 26	101 1 58	102 49 8	104 35 55
	Pollux	W.	60 20 10	62 8 20	63 56 8	65 43 33
	Saturn	W.	43 55 33	45 44 27	47 32 59	49 21 8
	Regulus	W.	23 20 59	25 9 22	26 57 24	28 45 3
	Spica	E.	30 45 24	28 57 18	27 9 37	25 22 21
	Antares	E.	76 34 54	74 46 30	72 58 28	71 10 50
	Venus	E.	112 11 7	110 30 59	108 51 12	107 11 47
19	Jupiter	W.	113 23 36	115 7 51	116 51 39	118 35 0
	Pollux	W.	74 34 44	76 19 44	78 4 19	79 48 28
	Saturn	W.	58 15 53	60 1 35	61 46 52	63 31 42
	Regulus	W.	37 37 16	39 22 27	41 7 14	42 51 34
	Spica	E.	16 33 12	14 49 2	13 5 33	11 22 53

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
19	Antares	E.	69° 23′ 35″	67° 36′ 44″	65° 50′ 17″	64° 4′ 15″
	Venus	E.	105 32 44	103 54 4	102 15 47	100 37 54
20	Pollux	W.	81 32 12	83 15 29	84 58 20	86 40 45
	Saturn	W.	65 16 7	67 0 6	68 43 38	70 26 44
	Regulus	W.	44 35 28	46 18 57	48 1 59	49 44 34
	Antares	E.	55 20 27	53 36 59	51 53 57	50 11 22
	Venus	E.	92 34 40	90 59 18	89 24 21	87 49 51
	α Aquilæ	E.	106 59 19	105 32 49	104 6 27	102 40 13
	Sun	E.	138 55 23	137 19 26	135 43 55	134 8 50
21	Pollux	W.	95 6 18	96 46 7	98 25 29	100 4 27
	Saturn	W.	78 55 40	80 36 9	82 16 13	83 55 51
	Regulus	W.	58 11 0	59 50 59	61 30 32	63 9 40
	Antares	E.	41 45 1	40 5 3	38 25 30	36 46 23
	Venus	E.	80 3 50	78 53 56	77 0 28	75 29 25
	α Aquilæ	E.	95 32 5	94 7 14	92 42 41	91 18 27
	Sun	E.	126 19 58	124 47 30	123 15 27	121 43 50
22	Saturn	W.	92 7 51	93 45 3	95 21 52	96 58 19
	Regulus	W.	71 19 11	72 55 54	74 32 14	76 8 11
	Spica	W.	17 24 50	19 0 51	20 36 35	22 12 1
	Antares	E.	28 36 59	27 0 18	25 24 1	23 48 6
	Venus	E.	68 0 26	66 31 51	65 3 40	63 35 52
	α Aquilæ	E.	84 22 38	83 0 38	81 39 3	80 17 54
	Sun	E.	114 11 52	112 42 40	111 13 51	109 45 25
23	Saturn	W.	104 55 10	106 29 31	108 3 34	109 37 17
	Regulus	W.	84 2 35	85 36 28	87 10 1	88 43 16
	Spica	W.	30 4 39	31 38 16	33 11 36	34 44 38
	Venus	E.	56 22 26	54 56 49	53 31 32	52 6 36
	α Aquilæ	E.	73 39 0	72 20 40	71 2 51	69 45 34
	Sun	E.	102 28 33	101 2 11	99 36 8	98 10 24
24	Regulus	W.	96 25 12	97 56 48	99 28 10	100 59 17
	Spica	W.	42 25 44	43 57 11	45 28 25	46 59 25
	Venus	E.	45 6 35	43 43 29	42 20 39	40 58 7
	α Aquilæ	E.	63 27 32	62 13 44	61 0 35	59 48 6
	Sun	E.	91 6 1	89 41 55	88 18 4	86 54 27
25	Spica	W.	54 31 25	56 1 16	57 30 59	59 0 32
	Venus	E.	34 9 27	32 48 31	31 27 50	30 7 25
	Sun	E.	79 59 28	78 37 1	77 14 44	75 52 36
26	Spica	W.	66 26 27	67 55 19	69 24 6	70 52 50
	Antares	W.	20 32 28	22 1 22	23 30 11	24 58 56
	Sun	E.	69 3 51	67 42 25	66 21 4	64 59 47
27	Spica	W.	78 15 38	79 44 7	81 12 34	82 41 1
	Antares	W.	32 21 57	33 50 28	35 18 58	36 47 28
	Sun	E.	58 14 13	56 53 12	55 32 11	54 11 11
28	Spica	W.	90 3 30	91 32 6	93 0 44	94 29 26
	Antares	W.	44 10 12	45 38 50	47 7 32	48 36 16
	Sun	E.	47 26 0	46 4 52	44 43 42	43 22 28

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
19	Antares	E.	62 18 38	60 33 26	58 48 41	57 4 21
	Venus	E.	99 0 25	97 23 21	95 46 42	94 10 28
20	Pollux	W.	88 22 44	90 4 17	91 45 23	93 26 4
	Saturn	W.	72 9 24	73 51 37	75 33 24	77 14 45
	Regulus	W.	51 26 44	53 8 27	54 49 44	56 30 35
	Antares	E.	48 29 13	46 47 31	45 6 15	43 25 25
	Venus	E.	86 15 46	84 42 8	83 8 56	81 36 10
	a Aquilæ	E.	101 14 9	99 48 17	98 22 38	96 57 13
	Sun	E.	132 34 11	130 59 59	129 26 13	127 52 52
21	Pollux	W.	101 42 59	103 21 7	104 58 50	106 36 9
	Saturn	W.	85 35 4	87 13 52	88 52 16	90 30 15
	Regulus	W.	64 48 23	66 26 42	68 4 36	69 42 5
	Antares	E.	35 7 41	33 29 24	31 51 32	30 14 3
	Venus	E.	73 58 47	72 28 35	70 58 47	69 29 24
	a Aquilæ	E.	89 54 33	88 31 0	87 7 50	85 45 2
	Sun	E.	120 12 37	118 41 49	117 11 26	115 41 27
22	Saturn	W.	98 34 23	100 10 6	101 45 28	103 20 29
	Regulus	W.	77 43 46	79 18 59	80 53 52	82 28 24
	Spica	W.	23 47 9	25 21 59	26 56 31	28 30 44
	Antares	E.	22 12 33	20 37 23	19 2 34	17 28 6
	Venus	E.	62 8 27	60 41 24	59 14 44	57 48 24
	a Aquilæ	E.	78 57 12	77 36 57	76 17 9	74 57 50
	Sun	E.	108 17 20	106 49 37	105 22 15	103 55 14
23	Saturn	W.	111 10 43	112 43 51	114 16 42	115 49 17
	Regulus	W.	90 16 13	91 48 52	93 21 15	94 53 21
	Spica	W.	36 17 23	37 49 52	39 22 4	40 54 1
	Venus	E.	50 41 58	49 17 40	47 53 40	46 29 59
	a Aquilæ	E.	68 28 49	67 12 37	65 57 0	64 41 58
	Sun	E.	96 44 58	95 19 49	93 54 57	92 30 21
24	Regulus	W.	102 30 12	104 0 53	105 31 23	107 1 42
	Spica	W.	48 30 12	50 0 47	51 31 11	53 1 23
	Venus	E.	39 35 51	38 13 51	36 52 8	35 30 39
	a Aquilæ	E.	58 36 19	57 25 15	56 14 56	55 5 24
	Sun	E.	85 31 3	84 7 52	82 44 53	81 22 5
25	Spica	W.	60 29 57	61 59 15	63 28 25	64 57 29
	Venus	E.	28 47 17	27 27 26	26 7 52	24 48 38
	Sun	E.	74 30 37	73 8 45	71 47 0	70 25 22
26	Spica	W.	72 21 29	73 50 5	75 18 38	76 47 9
	Antares	W.	26 27 38	27 56 16	29 24 52	30 53 25
	Sun	E.	63 38 35	62 17 26	60 56 19	59 35 15
27	Spica	W.	84 9 29	85 37 57	87 6 26	88 34 57
	Antares	W.	38 15 59	39 44 30	41 13 2	42 41 36
	Sun	E.	52 50 11	51 29 10	50 8 8	48 47 5
28	Spica	W.	95 58 11	97 27 1	98 55 55	100 24 54
	Antares	W.	50 5 5	51 33 58	53 2 55	54 31 57
	Sun	E.	42 1 10	40 39 49	39 18 23	37 56 53

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Spica	W.	101 53 58	103 23 7	104 52 22	106 21 44
	Antares	W.	56 1 4	57 30 17	58 59 36	60 29 1
	Sun	E.	36 35 18	35 13 37	33 51 51	32 29 58
6	Sun	W.	19 50 30	21 18 25	22 46 31	24 14 50
	Aldebaran	E.	63 17 54	61 44 26	60 10 52	58 37 10
	Jupiter	E.	67 56 4	66 21 41	64 47 9	63 12 26
	Saturn	E.	121 8 32	119 32 36	117 56 28	116 20 10
7	Sun	W.	31 39 26	33 8 56	34 38 38	36 8 32
	Aldebaran	E.	50 47 18	49 13 7	47 38 54	46 4 39
	Jupiter	E.	55 16 22	53 40 40	52 4 48	50 28 47
	Pollux	E.	92 55 59	91 19 5	89 42 1	88 4 44
	Saturn	E.	108 15 49	106 38 23	105 0 46	103 22 57
8	Sun	W.	43 40 58	45 12 3	46 43 19	48 14 48
	Aldebaran	E.	38 13 43	36 39 48	35 6 4	33 32 35
	Jupiter	E.	42 26 29	40 49 36	39 12 36	37 35 29
	Pollux	E.	79 55 30	78 17 5	76 38 28	74 59 40
	Saturn	E.	95 11 3	93 32 5	91 52 56	90 13 35
9	Sun	W.	55 55 11	57 27 52	59 0 46	60 33 52
	Mars	W.	17 52 12	19 24 16	20 56 54	22 30 3
	Jupiter	E.	29 28 38	27 51 8	26 13 39	24 36 15
	Pollux	E.	66 42 41	65 2 42	63 22 31	61 42 8
	Saturn	E.	81 53 52	80 13 20	78 32 35	76 51 38
	Regulus	E.	103 35 53	101 55 41	100 15 16	98 34 40
10	Sun	W.	68 22 31	69 56 54	71 31 29	73 6 17
	Mars	W.	30 21 53	31 57 17	33 32 58	35 8 58
	α Arietis	W.	22 18 14	23 57 26	25 37 10	27 17 23
	Pollux	E.	53 17 12	51 35 37	49 53 50	48 11 51
	Saturn	E.	68 23 46	66 41 33	64 59 8	63 16 30
	Regulus	E.	90 8 28	88 26 35	86 44 30	85 2 11
11	Sun	W.	81 3 35	82 39 42	84 16 2	85 52 36
	Mars	W.	43 13 1	44 50 37	46 28 28	48 6 34
	α Arietis	W.	35 44 30	37 26 57	39 9 42	40 52 46
	Pollux	E.	39 38 56	37 55 47	36 12 27	34 28 56
	Saturn	E.	54 40 6	52 56 9	51 12 0	49 27 38
	Regulus	E.	76 27 22	74 43 44	72 59 53	71 15 49
12	Sun	W.	93 58 43	95 36 36	97 14 42	98 53 1
	Mars	W.	56 20 44	58 0 17	59 40 4	61 20 4
	α Arietis	W.	49 32 14	51 16 55	53 1 51	54 47 2
	Aldebaran	W.	20 18 7	21 48 24	23 20 54	24 55 14
	Saturn	E.	40 42 31	38 56 51	37 10 58	35 24 53
	Regulus	E.	62 32 9	60 46 45	59 1 8	57 15 19
13	Sun	W.	107 7 42	108 47 15	110 26 59	112 6 54
	Mars	W.	69 43 24	71 24 42	73 6 12	74 47 54
	α Arietis	W.	63 36 26	65 22 58	67 9 43	68 56 41
	Aldebaran	W.	33 6 18	34 47 18	36 29 0	38 11 20
	Jupiter	W.	26 17 57	28 1 53	29 46 16	31 31 3

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Spica	W.	107 51 12	109 20 47	110 50 28	112 20 17
	Antares	W.	61 58 32	63 28 11	64 57 57	66 27 50
	Sun	E.	31 8 0	29 45 55	28 23 44	27 1 25
6	Sun	W.	25 43 22	27 12 5	28 41 0	30 10 7
	Aldebaran	E.	57 3 22	55 29 29	53 55 30	52 21 26
	Jupiter	E.	61 37 33	60 2 30	58 27 17	56 51 54
	Saturn	E.	114 43 40	113 6 59	111 30 7	109 53 4
7	Sun	W.	37 38 38	39 8 55	40 39 24	42 10 5
	Aldebaran	E.	44 30 23	42 56 8	41 21 55	39 47 46
	Jupiter	E.	48 52 37	47 16 18	45 39 50	44 3 14
	Pollux	E.	86 27 16	84 49 37	83 11 46	81 33 44
	Saturn	E.	101 44 57	100 6 46	98 28 23	96 49 49
8	Sun	W.	49 46 28	51 18 21	52 50 25	54 22 42
	Aldebaran	E.	31 59 22	30 26 32	28 54 11	27 22 25
	Jupiter	E.	35 58 16	34 20 57	32 43 34	31 6 7
	Pollux	E.	73 20 39	71 41 28	70 2 4	68 22 29
	Saturn	E.	88 34 2	86 54 18	85 14 21	83 34 13
9	Sun	W.	62 7 11	63 40 42	65 14 26	66 48 22
	Mars	W.	24 3 39	25 37 40	27 12 4	28 46 49
	Jupiter	E.	22 58 58	21 21 54	19 45 7	18 8 46
	Pollux	E.	60 1 33	58 20 46	56 39 47	54 58 36
	Saturn	E.	75 10 29	73 29 7	71 47 32	70 5 45
	Regulus	E.	96 53 51	95 12 49	93 31 35	91 50 8
10	Sun	W.	74 41 18	76 16 33	77 52 0	79 27 41
	Mars	W.	36 45 14	38 21 47	39 58 35	41 35 40
	α Arietis	W.	28 58 3	30 39 7	32 20 34	34 2 22
	Pollux	E.	46 29 39	44 47 16	43 4 41	41 21 54
	Saturn	E.	61 33 39	59 50 35	58 7 19	56 23 49
	Regulus	E.	83 19 40	81 36 55	79 53 57	78 10 46
11	Sun	W.	87 29 23	89 6 23	90 43 37	92 21 4
	Mars	W.	49 44 55	51 23 31	53 2 21	54 41 26
	α Arietis	W.	42 36 7	44 19 45	46 3 39	47 47 49
	Pollux	E.	32 45 15	31 1 25	29 17 25	27 33 18
	Saturn	E.	47 43 3	45 58 14	44 13 13	42 27 58
	Regulus	E.	69 31 31	67 47 1	66 2 16	64 17 19
12	Sun	W.	100 31 32	102 10 16	103 49 13	105 28 21
	Mars	W.	63 0 18	64 40 45	66 21 25	68 2 18
	α Arietis	W.	56 32 27	58 18 6	60 3 59	61 50 6
	Aldebaran	W.	26 31 7	28 8 21	29 46 42	31 26 4
	Saturn	E.	33 38 35	31 52 6	30 5 24	28 18 31
	Regulus	E.	55 29 17	53 43 1	51 56 34	50 9 54
13	Sun	W.	113 47 0	115 27 17	117 7 45	118 48 22
	Mars	W.	76 29 48	78 11 52	79 54 7	81 36 33
	α Arietis	W.	70 43 50	72 31 11	74 18 42	76 6 24
	Aldebaran	W.	39 54 13	41 37 37	43 21 29	45 5 46
	Jupiter	W.	33 16 11	35 1 38	36 47 24	38 33 26

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
13	Regulus	E.	48 23 1	46 35 57	44 48 42	43 1 14
	Spica	E.	102 24 45	100 37 46	98 50 35	97 3 12
14	Sun	W.	120 29 8	122 10 4	123 51 8	125 32 20
	Mars	W.	83 19 8	85 1 53	86 44 47	88 27 49
	α Arietis	W.	77 54 16	79 42 18	81 30 29	83 18 49
	Aldebaran	W.	46 50 26	48 35 28	50 20 50	52 6 29
	Jupiter	W.	40 19 43	42 6 15	43 53 0	45 39 57
	Regulus	E.	34 1 18	32 12 49	30 24 12	28 35 26
	Spica	E.	88 3 36	86 15 12	84 26 39	82 37 57
15	Mars	W.	97 4 49	98 48 30	100 32 16	102 16 5
	Aldebaran	W.	60 58 31	62 45 30	64 32 39	66 19 56
	Jupiter	W.	54 37 12	56 25 4	58 13 1	60 1 3
	Pollux	W.	17 45 43	19 33 12	21 21 5	23 9 17
	Spica	E.	73 32 40	71 43 19	69 53 53	68 4 24
16	Mars	W.	110 55 40	112 39 36	114 23 29	116 7 21
	Aldebaran	W.	75 17 42	77 5 25	78 53 8	80 40 50
	Jupiter	W.	69 2 7	70 50 24	72 38 40	74 26 55
	Pollux	W.	32 13 1	34 2 4	35 51 9	37 40 16
	Spica	E.	58 56 27	57 6 50	55 17 15	53 27 43
	Antares	E.	104 48 30	102 58 47	101 9 6	99 19 27
17	Aldebaran	W.	89 38 40	91 25 58	93 13 9	95 0 11
	Jupiter	W.	83 27 17	85 15 5	87 2 46	88 50 18
	Pollux	W.	46 45 24	48 37 14	50 22 57	52 11 33
	Saturn	W.	31 47 41	33 32 3	35 26 18	37 15 25
	Spica	E.	44 21 2	42 32 0	40 43 7	38 54 22
	Antares	E.	90 12 8	88 22 57	86 33 54	84 44 59
18	Jupiter	W.	97 45 25	99 31 49	101 18 0	103 3 56
	Pollux	W.	61 12 13	62 59 47	64 47 7	66 34 14
	Saturn	W.	46 18 30	48 6 32	49 54 20	51 41 53
	Regulus	W.	24 13 5	26 0 54	27 48 28	29 35 49
	Antares	E.	75 42 57	73 55 9	72 7 34	70 20 14
19	Pollux	W.	75 25 55	77 11 24	78 56 35	80 41 27
	Saturn	W.	60 35 43	62 21 38	64 7 13	65 52 30
	Regulus	W.	38 28 33	40 14 14	41 59 36	43 44 40
	Antares	E.	61 27 31	59 41 50	57 56 28	56 11 25
	α Aquilæ	E.	112 2 31	110 35 19	109 7 59	107 40 34
20	Pollux	W.	89 20 48	91 3 37	92 46 6	94 28 12
	Saturn	W.	74 33 52	76 17 5	77 59 57	79 42 27
	Regulus	W.	52 24 57	54 7 58	55 50 37	57 32 55
	Antares	E.	47 31 9	45 48 9	44 5 30	42 23 13
	α Aquilæ	E.	100 23 36	98 56 29	97 29 32	96 2 47
	Venus	E.	114 10 18	112 35 38	111 1 20	109 27 23
21	Saturn	W.	88 9 22	89 49 37	91 29 30	93 9 0
	Regulus	W.	65 58 49	67 38 52	69 18 33	70 57 52
	Antares	E.	33 57 23	32 17 21	30 37 41	28 58 24
	α Aquilæ	E.	88 52 48	87 27 43	86 3 0	84 38 39

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
13	Regulus	E.	41 13 36	39 25 47	37 37 47	35 49 37
	Spica	E.	95 15 38	93 27 53	91 39 57	89 51 52
14	Sun	W.	127 13 40	128 55 7	130 36 40	132 18 19
	Mars	W.	90 10 59	91 54 17	93 37 41	95 21 12
	α Arietis	W.	85 7 17	86 55 53	88 44 35	90 33 24
	Aldebaran	W.	53 52 26	55 38 37	57 25 3	59 11 41
	Jupiter	W.	47 27 5	49 14 23	51 1 51	52 49 28
	Regulus	E.	26 46 32	24 57 31	23 8 22	21 19 8
	Spica	E.	80 49 7	79 0 10	77 11 6	75 21 55
15	Mars	W.	103 59 57	105 43 52	107 27 47	109 11 44
	Aldebaran	W.	68 7 20	69 54 49	71 42 24	73 30 2
	Jupiter	W.	61 49 10	63 37 21	65 25 35	67 13 50
	Pollux	W.	24 57 43	26 46 21	28 35 7	30 24 1
	Spica	E.	66 14 52	64 25 17	62 35 41	60 46 4
16	Mars	W.	117 51 8	119 34 52	121 18 30	123 2 2
	Aldebaran	W.	82 28 31	84 16 10	86 3 44	87 51 15
	Jupiter	W.	76 15 7	78 3 17	79 51 22	81 39 22
	Pollux	W.	39 29 22	41 18 28	43 7 30	44 56 29
	Spica	E.	51 38 13	49 48 47	47 59 26	46 10 11
	Antares	E.	97 29 50	95 40 17	93 50 49	92 1 25
17	Aldebaran	W.	96 47 3	98 33 46	100 20 16	102 6 34
	Jupiter	W.	90 37 41	92 24 54	94 11 56	95 58 47
	Pollux	W.	54 0 1	55 48 20	57 36 29	59 24 26
	Saturn	W.	39 4 23	40 53 12	42 41 49	44 30 16
	Spica	E.	37 5 48	35 17 24	33 29 12	31 41 14
	Antares	E.	82 56 13	81 7 37	79 19 12	77 30 59
18	Jupiter	W.	104 49 37	106 35 1	108 20 9	110 4 59
	Pollux	W.	68 21 6	70 4 43	71 54 4	73 40 8
	Saturn	W.	53 29 12	55 16 15	57 3 1	58 49 31
	Regulus	W.	31 22 54	33 9 44	34 56 17	36 42 34
	Antares	E.	68 33 9	66 46 19	64 59 46	63 13 30
19	Pollux	W.	82 25 59	84 10 12	85 54 5	87 37 37
	Saturn	W.	67 37 27	69 22 4	71 6 21	72 50 17
	Regulus	W.	45 29 24	47 13 48	48 57 52	50 41 35
	Antares	E.	54 26 41	52 42 17	50 58 13	49 14 31
	α Aquilæ	E.	106 13 6	104 45 38	103 18 13	101 50 51
20	Pollux	W.	96 9 56	97 51 18	99 32 18	101 12 55
	Saturn	W.	81 24 35	83 6 20	84 47 43	86 28 44
	Regulus	W.	59 14 50	60 56 23	62 37 34	64 18 23
	Antares	E.	40 41 19	38 59 46	37 18 36	35 37 48
	α Aquilæ	E.	94 36 15	93 9 58	91 43 57	90 18 13
	Venus	E.	107 53 49	106 20 36	104 47 45	103 15 17
21	Saturn	W.	94 48 8	96 26 53	98 5 16	99 43 16
	Regulus	W.	72 36 47	74 15 21	75 53 32	77 31 22
	Antares	E.	27 19 29	25 40 57	24 2 48	22 25 0
	α Aquilæ	E.	83 14 41	81 51 8	80 28 1	79 5 20

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
21	Venus	E.	101 43 11	100 11 28	98 40 7	97 9 9
22	Saturn	W.	101 20 55	102 58 12	104 35 7	106 11 41
	Regulus	W.	79 8 49	80 45 55	82 22 39	83 59 2
	Spica	W.	25 11 20	26 48 5	28 24 31	30 0 38
	α Aquilæ	E.	77 43 7	76 21 22	75 0 7	73 39 23
	Venus	E.	89 39 51	88 11 5	86 42 40	85 14 37
	Sun	E.	134 11 16	132 41 46	131 12 37	129 43 49
23	Regulus	W.	91 55 49	93 30 11	95 4 15	96 38 0
	Spica	W.	37 56 22	39 30 34	41 4 29	42 38 5
	α Aquilæ	E.	67 3 59	65 46 42	64 30 3	63 14 3
	Venus	E.	77 59 30	76 33 28	75 7 44	73 42 20
	Fomalhaut	E.	90 4 39	88 36 44	87 9 6	85 41 47
	Sun	E.	122 24 50	120 58 1	119 31 30	118 5 18
24	Regulus	W.	104 22 24	105 54 29	107 26 18	108 57 53
	Spica	W.	50 21 54	51 53 52	53 25 35	54 57 5
	α Aquilæ	E.	57 4 57	55 53 30	54 42 54	53 33 12
	Venus	E.	66 39 36	65 15 53	63 52 24	62 29 10
	Fomalhaut	E.	78 29 48	77 4 20	75 39 10	74 14 19
	Sun	E.	110 58 33	109 34 1	108 9 43	106 45 40
25	Spica	W.	62 31 15	64 1 30	65 31 35	67 1 29
	Antares	W.	16 37 11	18 7 27	19 37 34	21 7 31
	Venus	E.	55 36 18	54 14 20	52 52 32	51 30 54
	Fomalhaut	E.	67 14 49	65 51 52	64 29 16	63 7 0
	Sun	E.	99 48 42	98 25 53	97 3 16	95 40 48
26	Spica	W.	74 28 56	75 58 4	77 27 6	78 56 4
	Antares	W.	28 35 9	30 4 20	31 33 25	33 2 25
	Venus	E.	44 44 55	43 24 5	42 3 21	40 42 42
	Fomalhaut	E.	56 20 54	55 0 48	53 41 7	52 21 50
	Sun	E.	88 50 39	87 28 59	86 7 25	84 45 56
27	Spica	W.	86 19 54	87 48 33	89 17 11	90 45 49
	Antares	W.	40 26 30	41 55 12	43 23 53	44 52 34
	Venus	E.	34 0 25	32 40 5	31 19 46	29 59 28
	Fomalhaut	E.	45 52 37	44 36 24	43 20 49	42 5 56
	Sun	E.	77 59 28	76 38 18	75 17 9	73 56 0
28	Spica	W.	98 9 12	99 38 0	101 6 51	102 35 46
	Antares	W.	52 16 13	53 45 4	55 13 58	56 42 57
	Fomalhaut	E.	36 4 1	34 54 44	33 46 44	32 40 9
	Sun	E.	67 10 6	65 48 49	64 27 29	63 6 5
29	Antares	W.	64 9 8	65 38 42	67 8 23	68 38 13
	Sun	E.	56 17 52	54 55 55	53 33 51	52 11 39
30	Antares	W.	76 9 36	77 40 22	79 11 20	80 42 29
	Sun	E.	45 18 38	43 55 34	42 32 21	41 8 57
31	Antares	W.	88 21 13	89 53 36	91 26 12	92 59 2
	α Aquilæ	W.	44 54 14	45 56 34	47 0 21	48 5 30
	Sun	E.	34 9 23	32 44 56	31 20 19	29 55 31

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
21	Venus	E.	95 38 33	94 8 19	92 38 27	91 8 58
22	Saturn	W.	107 47 54	109 23 46	110 59 18	112 34 29
	Regulus	W.	85 35 4	87 10 46	88 46 7	90 21 8
	Spica	W.	31 36 25	33 11 53	34 47 1	36 21 51
	α Aquilæ	E.	72 19 11	70 59 31	69 40 25	68 21 54
	Venus	E.	83 46 55	82 19 34	80 52 33	79 25 51
	Sun	E.	128 15 21	126 47 13	125 19 26	123 51 58
23	Regulus	W.	98 11 27	99 44 36	101 17 29	102 50 5
	Spica	W.	44 11 24	45 44 26	47 17 11	48 49 40
	α Aquilæ	E.	61 58 45	60 44 10	59 30 19	58 17 14
	Venus	E.	72 17 13	70 52 24	69 27 51	68 3 36
	Fomalhaut	E.	84 14 47	82 48 4	81 21 40	79 55 35
	Sun	E.	116 39 23	115 13 46	113 48 25	112 23 21
24	Regulus	W.	110 29 14	112 0 21	113 31 16	115 1 58
	Spica	W.	56 28 20	57 59 22	59 30 12	61 0 49
	α Aquilæ	E.	52 24 27	51 16 42	50 9 59	49 4 20
	Venus	E.	61 6 9	59 43 23	58 20 49	56 58 28
	Fomalhaut	E.	72 49 47	71 25 34	70 1 39	68 38 4
	Sun	E.	105 21 51	103 58 15	102 34 52	101 11 41
25	Spica	W.	68 31 15	70 0 52	71 30 20	72 59 41
	Antares	W.	22 37 18	24 6 57	25 36 28	27 5 52
	Venus	E.	50 9 26	48 48 6	47 26 55	46 5 52
	Fomalhaut	E.	61 45 4	60 23 29	59 2 15	57 41 23
	Sun	E.	94 18 30	92 56 21	91 34 20	90 12 26
26	Spica	W.	80 24 56	81 53 45	83 22 31	84 51 13
	Antares	W.	34 31 21	36 0 12	37 29 1	38 57 47
	Venus	E.	39 22 7	38 1 37	36 41 10	35 20 47
	Fomalhaut	E.	51 3 0	49 44 38	48 26 46	47 9 25
	Sun	E.	83 24 31	82 3 11	80 41 54	79 20 40
27	Spica	W.	92 14 27	93 43 6	95 11 46	96 40 28
	Antares	W.	46 21 15	47 49 57	49 18 41	50 47 26
	Venus	E.	28 39 9	27 18 50	25 58 29	24 38 7
	Fomalhaut	E.	40 51 47	39 38 26	38 25 58	37 14 28
	Sun	E.	72 34 52	71 13 43	69 52 32	68 31 20
28	Spica	W.	104 4 45	105 33 50	107 3 0	108 32 17
	Antares	W.	58 12 0	59 41 8	61 10 22	62 39 42
	Fomalhaut	E.	31 35 8	30 31 52	29 30 33	28 31 23
	Sun	E.	61 44 37	60 23 4	59 1 26	57 39 42
29	Antares	W.	70 8 11	71 38 18	73 8 34	74 39 0
	Sun	E.	50 49 20	49 26 53	48 4 17	46 41 32
30	Antares	W.	82 13 49	83 45 21	85 17 6	86 49 3
	Sun	E.	39 45 23	38 21 39	36 57 44	35 33 39
31	Antares	W.	94 32 5	96 5 23	97 38 55	99 12 41
	α Aquilæ	W.	49 11 57	50 19 36	51 28 25	52 38 20
	Sun	E.	28 30 33	27 5 26	25 40 9	24 14 44

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
5	Sun	W.	26 0 23	27 33 43	29 7 18	30 41 9
	Jupiter	E.	36 20 30	34 41 16	33 1 58	31 22 36
	Pollux	E.	70 8 6	68 26 41	66 45 6	65 3 21
	Saturn	E.	84 36 17	82 54 40	81 12 51	79 30 52
	Regulus	E.	107 1 25	105 19 48	103 37 59	101 55 59
6	Sun	W.	38 33 44	40 8 51	41 44 9	43 19 37
	Pollux	E.	56 32 9	54 49 27	53 6 38	51 23 40
	Saturn	E.	70 58 24	69 15 26	67 32 19	65 49 4
	Regulus	E.	93 23 29	91 40 30	89 57 23	88 14 6
7	Sun	W.	51 19 21	52 55 44	54 32 15	56 8 53
	Mars	W.	21 3 44	22 40 10	24 17 1	25 54 13
	Pollux	E.	42 47 6	41 3 28	39 19 45	37 35 57
	Saturn	E.	57 10 44	55 26 41	53 42 31	51 58 15
	Regulus	E.	79 35 38	77 51 33	76 7 21	74 23 2
8	Sun	W.	64 13 53	65 51 13	67 28 39	69 6 11
	Mars	W.	34 4 22	35 43 2	37 21 53	39 0 53
	Aldebarau	W.	17 38 20	19 3 46	20 32 12	22 3 2
	Pollux	E.	28 56 9	27 12 7	25 28 7	23 44 9
	Saturn	E.	43 15 14	41 30 20	39 45 21	38 0 16
	Regulus	E.	65 39 46	63 54 48	62 9 45	60 24 36
9	Sun	W.	77 15 10	78 53 13	80 31 20	82 9 32
	Mars	W.	47 17 58	48 57 44	50 37 37	52 17 36
	Aldebaran	W.	30 0 52	31 39 35	33 19 0	34 59 2
	Jupiter	W.	19 21 47	21 2 39	22 44 7	24 26 2
	Saturn	E.	29 13 42	27 28 10	25 42 35	23 56 56
	Regulus	E.	51 37 33	49 51 54	48 6 11	46 20 23
	Spica	E.	105 39 34	103 54 0	102 8 20	100 22 37
10	Sun	W.	90 21 28	92 0 2	93 38 39	95 17 18
	Mars	W.	60 38 46	62 19 14	63 59 45	65 40 21
	Aldebaran	W.	43 26 7	45 8 35	46 51 19	48 34 18
	Jupiter	W.	33 0 25	34 43 59	36 27 42	38 11 33
	Regulus	E.	37 30 26	35 44 17	33 58 4	32 11 48
	Spica	E.	91 33 0	89 46 54	88 0 45	86 14 33
11	Sun	W.	103 31 10	105 10 1	106 48 54	108 27 47
	Mars	W.	74 4 3	75 44 55	77 25 48	79 6 43
	Aldebaran	W.	57 12 1	58 56 1	60 40 7	62 24 20
	Jupiter	W.	46 52 30	48 36 57	50 21 28	52 6 1
	Pollux	W.	14 3 41	15 46 58	17 30 54	19 15 18
	Spica	E.	77 22 57	75 36 32	73 50 6	72 3 38
12	Sun	W.	116 42 17	118 21 9	120 0 0	121 38 49
	Mars	W.	87 31 32	89 12 30	90 53 28	92 34 24
	Aldebaran	W.	71 6 31	72 51 6	74 35 42	76 20 20
	Jupiter	W.	60 49 24	62 34 7	64 18 52	66 3 36
	Pollux	W.	28 1 22	29 47 2	31 32 47	33 18 36
	Spica	E.	63 11 12	61 24 44	59 38 16	57 51 50
	Antares	E.	109 3 19	107 16 45	105 30 12	103 43 40

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
5	Sun	W.	32 15 14	33 49 33	35 24 4	36 58 48
	Jupiter	E.	29 43 12	28 3 49	26 24 28	24 45 11
	Pollux	E.	63 21 25	61 39 20	59 57 5	58 14 41
	Saturn	E.	77 48 42	76 6 22	74 23 53	72 41 13
	Regulus	E.	100 13 49	98 31 29	96 48 59	95 6 19
6	Sun	W.	44 55 16	46 31 4	48 7 1	49 43 7
	Pollux	E.	49 40 35	47 57 22	46 14 3	44 30 37
	Saturn	E.	64 5 40	62 22 8	60 38 27	58 54 39
	Regulus	E.	86 30 40	84 47 7	83 3 25	81 19 35
7	Sun	W.	57 45 39	59 22 33	60 59 33	62 36 40
	Mars	W.	27 31 45	29 9 33	30 47 36	32 25 53
	Pollux	E.	35 52 5	34 8 10	32 24 11	30 40 10
	Saturn	E.	50 13 51	48 29 21	46 44 45	45 0 3
	Regulus	E.	72 38 35	70 54 2	69 9 23	67 24 37
8	Sun	W.	70 43 48	72 21 31	73 59 19	75 37 12
	Mars	W.	40 40 2	42 19 20	43 58 45	45 38 18
	Aldebaran	W.	23 35 51	25 10 18	26 46 5	28 23 0
	Pollux	E.	22 0 17	20 16 34	18 33 3	16 49 49
	Saturn	E.	36 15 7	34 29 52	32 44 33	30 59 10
	Regulus	E.	58 39 21	56 54 2	55 8 37	53 23 7
9	Sun	W.	83 47 48	85 26 7	87 4 31	88 42 58
	Mars	W.	53 57 40	55 37 49	57 18 3	58 58 23
	Aldebaran	W.	36 39 36	38 20 39	40 2 7	41 43 57
	Jupiter	W.	26 8 21	27 50 59	29 33 54	31 17 3
	Saturn	E.	22 11 15	20 25 30	18 39 44	16 53 57
	Regulus	E.	44 34 31	42 48 35	41 2 36	39 16 33
	Spica	E.	98 36 49	96 50 57	95 5 2	93 19 3
10	Sun	W.	96 56 0	98 34 45	100 13 31	101 52 20
	Mars	W.	67 21 0	69 1 41	70 42 26	72 23 13
	Aldebaran	W.	50 17 29	52 0 52	53 44 26	55 28 10
	Jupiter	W.	39 55 32	41 39 38	43 23 51	45 8 8
	Regulus	E.	30 25 30	28 39 9	26 52 46	25 6 21
	Spica	E.	84 28 18	82 42 1	80 55 42	79 9 20
11	Sun	W.	110 6 41	111 45 35	113 24 30	115 3 24
	Mars	W.	80 47 40	82 28 37	84 9 35	85 50 34
	Aldebaran	W.	64 8 38	65 53 1	67 37 28	69 21 58
	Jupiter	W.	53 50 38	55 35 17	57 19 58	59 4 40
	Pollux	W.	21 0 4	22 45 7	24 30 23	26 15 49
	Spica	E.	70 17 10	68 30 41	66 44 11	64 57 42
12	Sun	W.	123 17 35	124 56 20	126 35 1	128 13 38
	Mars	W.	94 15 20	95 56 13	97 37 5	99 17 54
	Aldebaran	W.	78 4 58	79 49 35	81 34 12	83 18 48
	Jupiter	W.	67 48 19	69 33 2	71 17 43	73 2 22
	Pollux	W.	35 4 27	36 50 19	38 36 13	40 22 7
	Spica	E.	56 5 25	54 19 2	52 32 41	50 46 23
	Antares	E.	101 57 10	100 10 41	98 24 14	96 37 49

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
13	Mars	W.	100° 58′ 39″	102° 39′ 22″	104° 20′ 1″	106° 0′ 36″
	Aldebaran	W.	85 3 22	86 47 53	88 32 21	90 16 46
	Jupiter	W.	74 46 58	76 31 32	78 16 3	80 0 31
	Pollux	W.	42 8 0	43 53 52	45 39 42	47 25 30
	Saturn	W.	27 28 54	29 15 2	31 1 7	32 47 9
	Spica	E.	49 0 8	47 13 57	45 27 49	43 41 46
	Antares	E.	94 51 27	93 5 8	91 18 53	89 32 42
14	Aldebaran	W.	98 57 33	100 41 22	102 25 4	104 8 37
	Jupiter	W.	88 41 36	90 25 32	92 9 21	93 53 2
	Pollux	W.	56 13 32	57 58 54	59 44 9	61 29 18
	Saturn	W.	41 36 7	43 21 38	45 7 1	46 52 18
	Regulus	W.	19 13 27	20 59 5	22 44 36	24 30 0
	Spica	E.	34 52 55	33 7 29	31 22 11	29 37 2
	Antares	E.	80 42 59	78 57 20	77 11 47	75 26 22
15	Jupiter	W.	102 29 21	104 12 8	105 54 44	107 37 9
	Pollux	W.	70 13 3	71 57 21	73 41 39	75 25 26
	Saturn	W.	55 36 35	57 20 59	59 5 11	60 49 14
	Regulus	W.	33 14 56	34 59 28	36 43 49	38 27 59
	Antares	E.	66 41 23	64 56 51	63 12 30	61 28 19
	a Aquilæ	E.	116 19 49	114 54 45	113 29 20	112 3 37
16	Pollux	W.	84 2 18	85 45 3	87 27 33	89 9 50
	Saturn	W.	69 26 25	71 9 13	72 51 47	74 34 7
	Regulus	W.	47 5 53	48 48 50	50 31 33	52 14 2
	Antares	E.	52 50 25	51 7 28	49 24 45	47 42 17
	a Aquilæ	E.	104 52 2	103 25 24	101 58 44	100 32 5
17	Pollux	W.	97 37 32	99 18 17	100 58 47	102 39 0
	Saturn	W.	83 2 4	84 42 52	86 23 25	88 3 40
	Regulus	W.	60 42 44	62 23 42	64 4 24	65 44 49
	Antares	E.	39 13 35	37 32 37	35 51 56	34 11 31
	a Aquilæ	E.	93 20 1	91 54 2	90 28 15	89 2 41
18	Saturn	W.	96 20 44	97 59 17	99 37 32	101 15 29
	Regulus	W.	74 2 42	75 41 25	77 19 51	78 57 58
	Spica	W.	20 5 56	21 44 9	23 22 8	24 59 53
	a Aquilæ	E.	81 59 2	80 35 17	79 11 55	77 48 57
	Fomalhaut	E.	106 44 36	105 13 17	103 42 7	102 11 9
19	Saturn	W.	109 20 49	110 57 0	112 32 53	114 8 28
	Regulus	W.	87 4 12	88 40 34	90 16 38	91 52 25
	Spica	W.	33 4 44	34 40 53	36 16 46	37 52 23
	a Aquilæ	E.	71 0 49	69 40 41	68 21 6	67 2 6
	Fomalhaut	E.	94 39 20	93 9 41	91 40 16	90 11 7
	Venus	E.	113 27 25	111 59 51	110 32 35	109 5 36
20	Regulus	W.	99 47 2	101 21 7	102 54 56	104 28 29
	Spica	W.	45 46 18	47 20 16	48 53 59	50 27 26
	a Aquilæ	E.	60 36 37	59 21 37	58 7 24	56 53 59
	Fomalhaut	E.	82 49 31	81 22 4	79 54 55	78 28 6
	Venus	E.	101 55 0	100 29 44	99 4 44	97 39 59
	a Pegasi	E.	104 42 51	103 13 16	101 43 53	100 14 42

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
13	Mars	W.	107 41 6	109 21 32	111 1 51	112 42 5
	Aldebaran	W.	92 1 6	93 45 22	95 29 32	97 13 36
	Jupiter	W.	81 44 54	83 29 13	85 13 26	86 57 34
	Pollux	W.	49 11 15	50 56 56	52 42 33	54 28 5
	Saturn	W.	34 33 7	36 19 0	38 4 48	39 50 31
	Spica	E.	41 55 48	40 9 55	38 24 9	36 38 28
	Antares	E.	87 46 35	86 0 32	84 14 35	82 28 44
14	Aldebaran	W.	105 52 1	107 35 15	109 18 18	111 1 10
	Jupiter	W.	95 36 35	97 20 1	99 3 17	100 46 24
	Pollux	W.	63 14 19	64 59 13	66 43 58	68 28 35
	Saturn	W.	48 37 27	50 22 27	52 7 19	53 52 2
	Regulus	W.	26 15 16	28 0 25	29 45 24	31 30 15
	Spica	E.	27 52 3	26 7 14	24 22 36	22 38 11
	Antares	E.	73 41 5	71 55 56	70 10 56	68 26 5
15	Jupiter	W.	109 19 22	111 1 23	112 43 11	114 24 46
	Pollux	W.	77 9 12	78 52 47	80 36 10	82 19 20
	Saturn	W.	62 33 4	64 16 43	66 0 10	67 43 24
	Regulus	W.	40 11 58	41 55 46	43 39 21	45 22 44
	Antares	E.	59 44 20	58 0 33	56 16 58	54 33 35
	α Aquilæ	E.	110 37 39	109 11 27	107 45 6	106 18 37
16	Pollux	W.	90 51 53	92 33 40	94 15 13	95 56 30
	Saturn	W.	76 16 13	77 58 4	79 39 39	81 21 0
	Regulus	W.	53 56 16	55 38 16	57 20 1	59 1 30
	Antares	E.	46 0 2	44 18 2	42 36 18	40 54 49
	α Aquilæ	E.	99 5 29	97 38 57	96 12 30	94 46 11
17	Pollux	W.	104 18 56	105 58 35	107 37 56	109 17 1
	Saturn	W.	89 43 39	91 23 21	93 2 46	94 41 54
	Regulus	W.	67 24 58	69 4 50	70 44 25	72 23 42
	Antares	E.	32 31 23	30 51 31	29 11 57	27 32 40
	α Aquilæ	E.	87 37 22	86 12 19	84 47 34	83 23 8
18	Saturn	W.	102 53 9	104 30 31	106 7 34	107 44 21
	Regulus	W.	80 35 48	82 13 21	83 50 36	85 27 33
	Spica	W.	26 37 22	28 14 37	29 51 35	31 28 18
	α Aquilæ	E.	76 26 24	75 4 17	73 42 38	72 21 28
	Fomalhaut	E.	100 40 21	99 9 46	97 39 24	96 9 15
19	Saturn	W.	115 43 46	117 18 47	118 53 30	120 27 57
	Regulus	W.	93 27 54	95 3 6	96 38 2	98 12 40
	Spica	W.	39 27 43	41 2 46	42 37 33	44 12 3
	α Aquilæ	E.	65 43 42	64 25 55	63 8 48	61 52 21
	Fomalhaut	E.	88 42 14	87 13 37	85 45 17	84 17 15
	Venus	E.	107 38 55	106 12 31	104 46 24	103 20 34
20	Regulus	W.	106 1 47	107 34 49	109 7 36	110 40 9
	Spica	W.	52 0 37	53 33 34	55 6 16	56 38 43
	α Aquilæ	E.	55 41 25	54 29 44	53 19 0	52 9 14
	Fomalhaut	E.	77 1 35	75 35 23	74 9 31	72 43 58
	Venus	E.	96 15 31	94 51 18	93 27 21	92 3 38
	α Pegasi	E.	98 45 43	97 16 56	95 48 23	94 20 2

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
21	Spica	W.	58 10 56	59 42 56	61 14 42	62 46 15
	Fomalhaut	E.	71 18 46	69 53 54	68 29 23	67 5 13
	Venus	E.	90 40 10	89 16 56	87 53 56	86 31 9
	α Pegasi	E.	92 51 53	91 23 57	89 56 14	88 28 43
	Sun	E.	130 32 58	129 8 39	127 44 33	126 20 39
22	Spica	W.	70 20 58	71 51 22	73 21 36	74 51 40
	Antares	W.	24 27 11	25 57 38	27 27 55	28 58 2
	Fomalhaut	E.	60 9 56	58 48 2	57 26 34	56 5 31
	Venus	E.	79 40 23	78 18 48	76 57 24	75 36 9
	α Pegasi	E.	81 14 16	79 47 58	78 21 53	76 56 0
	Sun	E.	119 24 0	118 1 12	116 38 33	115 16 4
23	Spica	W.	82 19 56	83 49 14	85 18 26	86 47 33
	Antares	W.	36 26 34	37 55 56	39 25 11	40 54 21
	Fomalhaut	E.	49 27 21	48 9 17	46 51 48	45 34 57
	Venus	E.	68 52 8	67 31 42	66 11 23	64 51 9
	α Pegasi	E.	69 49 24	68 24 39	67 0 5	65 35 42
	Sun	E.	108 25 36	107 3 51	105 42 11	104 20 36
24	Spica	W.	94 12 9	95 40 56	97 9 42	98 38 28
	Antares	W.	48 19 14	49 48 5	51 16 54	52 45 43
	Fomalhaut	E.	39 21 37	38 9 33	36 58 32	35 48 39
	Venus	E.	58 11 9	56 51 19	55 31 31	54 11 44
	α Pegasi	E.	58 36 33	57 13 18	55 50 15	54 27 25
	Sun	E.	97 33 41	96 12 25	94 51 11	93 29 57
25	Spica	W.	106 2 27	107 31 22	109 0 20	110 29 22
	Antares	W.	60 10 1	61 38 59	63 8 0	64 37 6
	Venus	E.	47 32 52	46 13 3	44 53 11	43 33 17
	α Pegasi	E.	47 36 42	46 15 22	44 54 21	43 33 40
	Sun	E.	86 43 35	85 22 13	84 0 47	82 39 17
26	Antares	W.	72 3 59	73 33 42	75 3 33	76 33 34
	Venus	E.	36 52 50	35 32 30	34 12 6	32 51 36
	α Pegasi	E.	36 56 48	35 39 7	34 22 9	33 6 0
	Sun	E.	75 50 25	74 28 19	73 6 5	71 43 42
27	Antares	W.	84 6 6	85 37 11	87 8 28	88 39 58
	α Aquilæ	W.	42 1 30	42 59 13	43 58 36	44 59 34
	Venus	E.	26 7 42	24 46 40	23 25 34	22 4 26
	Sun	E.	64 49 24	63 26 0	62 2 24	60 38 35
28	Antares	W.	96 20 59	97 53 57	99 27 11	101 0 41
	α Aquilæ	W.	50 25 10	51 33 58	52 43 52	53 54 49
	Sun	E.	53 36 15	52 11 5	50 45 39	49 19 59
29	*α* Aquilæ	W.	60 3 32	61 19 49	62 36 52	63 54 38
	Fomalhaut	W.	33 47 34	35 0 5	36 14 23	37 30 19
	Sun	E.	42 7 46	40 40 32	39 13 3	37 45 18
30	*α* Aquilæ	W.	70 33 30	71 55 5	73 17 13	74 39 53
	Fomalhaut	W.	44 10 40	45 34 15	46 58 49	48 24 20
	Sun	E.	30 22 52	28 53 42	27 24 21	25 54 51

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
21	Spica	W.	64 17 35	65 48 43	67 19 39	68 50 24
	Fomalhaut	E.	65 41 25	64 17 58	62 54 54	61 32 13
	Venus	E.	85 8 36	83 46 14	82 24 6	81 2 9
	α Pegasi	E.	87 1 25	85 34 19	84 7 26	82 40 45
	Sun	E.	124 56 57	123 33 26	122 10 7	120 46 58
22	Spica	W.	76 21 35	77 51 22	79 21 0	80 50 31
	Antares	W.	30 28 0	31 57 50	33 27 32	34 57 7
	Fomalhaut	E.	54 44 55	53 24 47	52 5 8	50 45 59
	Venus	E.	74 15 4	72 54 8	71 33 20	70 12 40
	α Pegasi	E.	75 30 18	74 4 47	72 39 29	71 14 21
	Sun	E.	113 53 43	112 31 30	111 9 25	109 47 27
23	Spica	W.	88 16 35	89 45 33	91 14 28	92 43 20
	Antares	W.	42 23 27	43 52 29	45 21 27	46 50 22
	Fomalhaut	E.	44 18 45	43 3 16	41 48 32	40 34 38
	Venus	E.	63 31 1	62 10 57	60 50 58	59 31 2
	α Pegasi	E.	64 11 30	62 47 29	61 23 39	60 0 0
	Sun	E.	102 59 7	101 37 41	100 16 18	98 54 58
24	Spica	W.	100 7 13	101 36 0	103 4 47	104 33 36
	Antares	W.	54 14 32	55 43 22	57 12 13	58 41 6
	Fomalhaut	E.	34 40 1	33 32 45	32 27 0	31 22 54
	Venus	E.	52 51 58	51 32 12	50 12 27	48 52 40
	α Pegasi	E.	53 4 48	51 42 24	50 20 14	48 58 20
	Sun	E.	92 8 43	90 47 28	89 26 13	88 4 55
25	Spica	W.	111 58 28	113 27 40	114 56 57	116 26 21
	Antares	W.	66 6 17	67 35 33	69 4 55	70 34 23
	Venus	E.	42 13 19	40 53 18	39 33 13	38 13 4
	α Pegasi	E.	42 13 22	40 53 29	39 34 3	38 15 8
	Sun	E.	81 17 42	79 56 2	78 34 16	77 12 24
26	Antares	W.	78 3 43	79 34 3	81 4 33	82 35 14
	Venus	E.	31 31 0	30 10 19	28 49 32	27 28 40
	α Pegasi	E.	31 50 47	30 36 38	29 23 43	28 12 12
	Sun	E.	70 21 11	68 58 29	67 35 38	66 12 36
27	Antares	W.	90 11 41	91 43 39	93 15 50	94 48 17
	α Aquilæ	W.	46 2 0	47 5 51	48 11 2	49 17 30
	Venus	E.	20 43 16	19 22 8	18 1 4	16 40 8
	Sun	E.	59 14 34	57 50 20	56 25 52	55 1 11
28	Antares	W.	102 34 27	104 8 31	105 42 53	107 17 32
	α Aquilæ	W.	55 6 45	56 19 37	57 33 24	58 48 3
	Sun	E.	47 54 4	46 27 53	45 1 26	43 34 44
29	α Aquilæ	W.	65 13 7	66 32 16	67 52 3	69 12 29
	Fomalhaut	W.	38 47 46	40 6 37	41 26 46	42 48 9
	Sun	E.	36 17 18	34 49 2	33 20 33	31 51 49
30	α Aquilæ	W.	76 3 3	77 26 42	78 50 49	80 15 21
	Fomalhaut	W.	49 50 45	51 17 59	52 46 1	54 14 48
	Sun	E.	24 25 13	22 55 28	21 25 42	19 55 58

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
4	Sun	W.	21 15 8	22 51 39	24 28 39	26 6 2
	Pollux	E.	46 53 26	45 7 29	43 21 26	41 35 17
	Saturn	E.	61 57 37	60 11 37	58 25 27	56 39 10
	Regulus	E.	83 42 20	81 55 57	80 9 25	78 22 45
5	Sun	W.	34 17 24	35 56 18	37 35 22	39 14 34
	Pollux	E.	32 43 28	30 57 1	29 10 36	27 24 13
	Saturn	E.	47 45 59	45 59 4	44 12 6	42 25 3
	Regulus	E.	69 27 41	67 40 23	65 53 1	64 5 35
6	Sun	W.	47 32 2	49 11 43	50 51 26	52 31 10
	Mars	W.	25 11 25	26 52 24	28 33 33	30 14 51
	Jupiter	W.	11 7 30	12 44 55	14 24 22	16 5 11
	Saturn	E.	33 29 18	31 42 6	29 54 53	28 7 42
	Regulus	E.	55 7 49	53 20 12	51 32 34	49 44 58
	Spica	E.	109 10 8	107 22 35	105 35 3	103 47 30
7	Sun	W.	60 49 52	62 29 33	64 9 11	65 48 47
	Mars	W.	38 42 24	40 24 0	42 5 35	43 47 10
	Jupiter	W.	24 39 46	26 23 44	28 7 53	29 52 9
	Regulus	E.	40 47 15	38 59 50	37 12 28	35 25 10
	Spica	E.	94 50 7	93 2 45	91 15 26	89 28 11
8	Sun	W.	74 5 50	75 45 1	77 24 6	79 3 7
	Mars	W.	52 14 30	53 55 47	55 37 0	57 18 9
	Jupiter	W.	38 34 17	40 18 43	42 3 7	43 47 29
	Pollux	W.	11 7 6	12 48 15	14 30 39	16 13 52
	Regulus	E.	26 29 44	24 42 55	22 56 12	21 9 34
	Spica	E.	80 33 1	78 46 14	76 59 32	75 12 57
9	Sun	W.	87 16 36	88 54 59	90 33 14	92 11 22
	Mars	W.	65 42 30	67 23 4	69 3 31	70 43 52
	Jupiter	W.	52 28 18	54 12 13	55 56 3	57 39 46
	Pollux	W.	24 55 34	26 40 20	28 25 7	30 9 54
	Spica	E.	66 21 36	64 35 40	62 49 52	61 4 11
	Antares	E.	112 13 31	110 27 31	108 41 37	106 55 50
10	Sun	W.	100 20 5	101 57 25	103 34 37	105 11 41
	Mars	W.	79 3 47	80 43 24	82 22 52	84 2 12
	Jupiter	W.	66 16 42	67 59 44	69 42 38	71 25 25
	Pollux	W.	38 53 10	40 37 36	42 21 55	44 6 9
	Saturn	W.	23 14 6	24 58 36	26 42 59	28 27 13
	Spica	E.	52 17 45	50 32 52	48 48 8	47 3 33
	Antares	E.	98 8 53	96 23 53	94 39 2	92 54 18
11	Sun	W.	113 14 44	114 50 53	116 26 52	118 2 41
	Mars	W.	92 16 49	93 55 18	95 33 38	97 11 50
	Jupiter	W.	79 57 15	81 39 11	83 20 59	85 2 38
	Pollux	W.	52 45 33	54 29 3	56 12 25	57 55 38
	Saturn	W.	37 6 20	38 49 43	40 32 57	42 16 2
	Regulus	W.	15 44 23	17 28 9	19 11 48	20 55 17
	Spica	E.	38 22 52	36 39 13	34 55 43	33 12 24
	Antares	E.	84 12 50	82 28 59	80 45 17	79 1 43

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
4	Sun	W.	27 43 47	29 21 49	31 0 7	32 38 39
	Pollux	E.	39 49 2	38 2 43	36 16 20	34 29 55
	Saturn	E.	54 52 45	53 6 12	51 19 34	49 32 49
	Regulus	E.	76 35 58	74 49 3	73 2 1	71 14 54
5	Sun	W.	40 53 54	42 33 19	44 12 49	45 52 24
	Pollux	E.	25 37 56	23 51 46	22 5 47	20 20 1
	Saturn	E.	40 37 58	38 50 50	37 3 41	35 16 30
	Regulus	E.	62 18 6	60 30 34	58 43 1	56 55 25
6	Sun	W.	54 10 55	55 50 41	57 30 26	59 10 10
	Mars	W.	31 56 14	33 37 43	35 19 14	37 0 49
	Jupiter	W.	17 47 0	19 29 31	21 12 34	22 56 1
	Saturn	E.	26 20 32	24 33 24	22 46 18	20 59 14
	Regulus	E.	47 57 22	46 9 47	44 22 14	42 34 44
	Spica	E.	101 59 58	100 12 27	98 24 58	96 37 31
7	Sun	W.	67 28 19	69 7 48	70 47 13	72 26 34
	Mars	W.	45 28 44	47 10 15	48 51 43	50 33 8
	Jupiter	W.	31 36 30	33 20 55	35 5 22	36 49 49
	Regulus	E.	33 37 55	31 50 45	30 3 40	28 16 39
	Spica	E.	87 41 0	85 53 53	84 6 51	82 19 53
8	Sun	W.	80 42 1	82 20 50	83 59 32	85 38 8
	Mars	W.	58 59 12	60 40 10	62 21 3	64 1 49
	Jupiter	W.	45 31 47	47 16 2	49 0 12	50 44 18
	Pollux	W.	17 57 40	19 41 50	21 26 15	23 10 51
	Regulus	E.	19 23 4	17 36 40	15 50 24	14 4 15
	Spica	E.	73 26 27	71 40 4	69 53 48	68 7 38
9	Sun	W.	93 49 22	95 27 14	97 4 59	98 42 36
	Mars	W.	72 24 6	74 4 12	75 44 12	77 24 3
	Jupiter	W.	59 23 23	61 6 53	62 50 16	64 33 33
	Pollux	W.	31 54 40	33 39 23	35 24 3	37 8 39
	Spica	E.	59 18 38	57 33 12	55 47 55	54 2 46
	Antares	E.	105 10 11	103 24 40	101 39 17	99 54 1
10	Sun	W.	106 48 35	108 25 21	110 1 58	111 38 25
	Mars	W.	85 41 25	87 20 28	88 59 24	90 38 11
	Jupiter	W.	73 8 3	74 50 34	76 32 56	78 15 10
	Pollux	W.	45 50 16	47 34 16	49 18 9	51 1 55
	Saturn	W.	30 11 19	31 55 17	33 39 7	35 22 48
	Spica	E.	45 19 6	43 34 49	41 50 41	40 6 42
	Antares	E.	91 9 44	89 25 17	87 40 59	85 56 50
11	Sun	W.	119 38 21	121 13 50	122 49 9	124 24 17
	Mars	W.	98 49 52	100 27 44	102 5 28	103 43 2
	Jupiter	W.	86 44 8	88 25 28	90 6 39	91 47 41
	Pollux	W.	59 38 43	61 21 40	63 4 28	64 47 7
	Saturn	W.	43 58 58	45 41 45	47 24 23	49 6 50
	Regulus	W.	22 38 38	24 21 51	26 4 54	27 47 48
	Spica	E.	31 29 15	29 46 17	28 3 30	26 20 55
	Antares	E.	77 18 19	75 35 5	73 51 59	72 9 3

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
12	Sun	W.	125 59 15	127 34 1	129 8 37	130 43 1
	Mars	W.	105 20 26	106 57 40	108 34 44	110 11 38
	Jupiter	W.	93 28 33	95 9 15	96 49 48	98 30 10
	Pollux	W.	66 29 37	68 11 57	69 54 8	71 36 10
	Saturn	W.	50 49 8	52 31 17	54 13 15	55 55 4
	Regulus	W.	29 30 32	31 13 7	32 55 32	34 37 48
	Spica	E.	24 38 32	22 56 22	21 14 26	19 32 44
	Antares	E.	70 26 17	68 43 41	67 1 14	65 18 57
13	Jupiter	W.	106 49 26	108 28 45	110 7 53	111 46 50
	Pollux	W.	80 3 49	81 44 50	83 25 40	85 6 20
	Saturn	W.	64 21 34	66 2 20	67 42 56	69 23 21
	Regulus	W.	43 6 35	44 47 49	46 28 53	48 9 46
	Antares	E.	56 50 6	55 8 51	53 27 47	51 46 53
	α Aquilæ	E.	108 16 28	106 51 38	105 26 41	104 1 39
14	Pollux	W.	93 26 53	95 6 25	96 45 46	98 24 55
	Saturn	W.	77 42 37	79 21 54	81 0 59	82 39 52
	Regulus	W.	56 31 23	58 11 9	59 50 42	61 30 4
	Antares	E.	43 25 14	41 45 28	40 5 54	38 26 32
	α Aquilæ	E.	96 56 6	95 31 5	94 6 10	92 41 21
15	Pollux	W.	106 37 35	108 15 30	109 53 12	111 30 40
	Saturn	W.	90 51 16	92 28 56	94 6 23	95 43 37
	Regulus	W.	69 43 53	71 22 2	72 59 59	74 37 43
	Spica	W.	15 48 54	17 26 13	19 3 28	20 40 36
	Antares	E.	30 12 42	28 34 33	26 56 36	25 18 53
	α Aquilæ	E.	85 39 40	84 15 57	82 52 29	81 29 17
	Fomalhaut	E.	110 43 27	109 13 10	107 42 55	106 12 44
16	Saturn	W.	103 46 35	105 22 32	106 58 15	108 33 45
	Regulus	W.	82 43 9	84 19 35	85 55 48	87 31 48
	Spica	W.	28 44 4	30 20 14	31 56 12	33 31 59
	α Aquilæ	E.	74 38 8	73 17 1	71 56 18	70 36 3
	Fomalhaut	E.	98 43 17	97 13 47	95 44 26	94 15 15
17	Regulus	W.	95 28 31	97 3 12	98 37 40	100 11 55
	Spica	W.	41 27 48	43 2 21	44 36 41	46 10 49
	α Aquilæ	E.	64 2 16	62 45 11	61 28 45	60 12 59
	Fomalhaut	E.	86 52 13	85 24 15	83 56 31	82 29 1
	α Pegasi	E.	108 47 9	107 17 5	105 47 9	104 17 21
18	Regulus	W.	107 59 59	109 32 57	111 5 44	112 38 18
	Spica	W.	53 58 20	55 31 13	57 3 54	58 36 23
	α Aquilæ	E.	54 5 23	52 54 24	51 44 23	50 35 23
	Fomalhaut	E.	75 15 25	73 49 32	72 23 57	70 58 40
	α Pegasi	E.	96 50 40	95 21 49	93 53 9	92 24 39
19	Spica	W.	66 15 56	67 47 17	69 18 28	70 49 28
	Antares	W.	20 22 6	21 53 32	23 24 46	24 55 51
	Fomalhaut	E.	63 57 14	62 34 1	61 11 10	59 48 43
	α Pegasi	E.	85 4 57	83 37 35	82 10 24	80 43 25
	Venus	E.	115 25 36	114 3 41	112 41 56	111 20 20

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
12	Sun	W.	132 17 13	133 51 13	135 25 1	136 58 36
	Mars	W.	111 48 22	113 24 56	115 1 19	116 37 31
	Jupiter	W.	100 10 22	101 50 24	103 30 15	105 9 56
	Pollux	W.	73 18 1	74 59 43	76 41 15	78 22 37
	Saturn	W.	57 36 42	59 18 11	60 59 29	62 40 37
	Regulus	W.	36 19 54	38 1 50	39 43 35	41 25 10
	Spica	E.	17 51 20	16 10 13	14 29 29	12 49 10
	Antares	E.	63 36 51	61 54 54	60 13 8	58 31 32
13	Jupiter	W.	113 25 35	115 4 9	116 42 31	118 20 41
	Pollux	W.	86 46 49	88 27 7	90 7 14	91 47 9
	Saturn	W.	71 3 35	72 43 37	74 23 29	76 3 9
	Regulus	W.	49 50 28	51 30 58	53 11 18	54 51 26
	Antares	E.	50 6 11	48 25 40	46 45 20	45 5 11
	a Aquilæ	E.	102 36 33	101 11 26	99 46 18	98 21 11
14	Pollux	W.	100 3 51	101 42 36	103 21 8	104 59 28
	Saturn	W.	84 18 33	85 57 3	87 35 20	89 13 24
	Regulus	W.	63 9 14	64 48 13	66 26 59	68 5 32
	Antares	E.	36 47 21	35 8 23	33 29 37	31 51 3
	a Aquilæ	E.	91 16 40	89 52 8	88 27 47	87 3 37
15	Pollux	W.	113 7 56	114 44 59	116 21 48	117 58 24
	Saturn	W.	97 20 39	98 57 28	100 34 3	102 10 26
	Regulus	W.	76 15 13	77 52 32	79 29 37	81 6 29
	Spica	W.	22 17 37	23 54 29	25 31 11	27 7 43
	Antares	E.	23 41 22	22 4 4	20 26 59	18 50 7
	a Aquilæ	E.	80 6 23	78 43 48	77 21 33	75 59 39
	Fomalhaut	E.	104 42 38	103 12 37	101 42 43	100 12 56
16	Saturn	W.	110 9 2	111 44 5	113 18 55	114 53 33
	Regulus	W.	89 7 35	90 43 9	92 18 30	93 53 37
	Spica	W.	35 7 33	36 42 55	38 18 5	39 53 3
	a Aquilæ	E.	69 16 15	67 56 57	66 38 10	65 19 56
	Fomalhaut	E.	92 46 15	91 17 26	89 48 49	88 20 25
17	Regulus	W.	101 45 58	103 19 47	104 53 24	106 26 48
	Spica	W.	47 44 44	49 18 26	50 51 56	52 25 14
	a Aquilæ	E.	58 57 55	57 43 35	56 30 1	55 17 16
	Fomalhaut	E.	81 1 46	79 34 46	78 8 3	76 41 35
	a Pegasi	E.	102 47 42	101 18 12	99 48 52	98 19 41
18	Regulus	W.	114 10 40	115 42 51	117 14 50	118 46 37
	Spica	W.	60 8 41	61 40 46	63 12 41	64 44 24
	a Aquilæ	E.	49 27 26	48 20 38	47 15 1	46 10 40
	Fomalhaut	E.	69 33 43	68 9 5	66 44 47	65 20 50
	a Pegasi	E.	90 56 21	89 28 13	88 0 16	86 32 31
19	Spica	W.	72 20 19	73 50 59	75 21 30	76 51 52
	Antares	W.	26 26 45	27 57 30	29 28 5	30 58 31
	Fomalhaut	E.	58 26 41	57 5 4	55 43 54	54 23 12
	a Pegasi	E.	79 16 37	77 50 1	76 23 37	74 57 25
	Venus	E.	109 58 54	108 37 38	107 16 31	105 55 33

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
20	Spica	W.	78 22 6	79 52 10	81 22 7	82 51 56
	Antares	W.	32 28 48	33 58 56	35 28 57	36 58 50
	Fomalhaut	E.	53 2 59	51 43 16	50 24 6	49 5 29
	a Pegasi	E.	73 31 24	72 5 36	70 40 0	69 14 36
	Venus	E.	104 34 43	103 14 2	101 53 28	100 33 2
	Sun	E.	138 25 44	137 3 32	135 41 26	134 19 25
21	Spica	W.	90 19 17	91 48 28	93 17 34	94 46 35
	Antares	W.	44 26 30	45 55 45	47 24 54	48 54 0
	Fomalhaut	E.	42 42 11	41 27 47	40 14 16	39 1 44
	a Pegasi	E.	62 10 40	60 46 32	59 22 36	57 58 54
	Venus	E.	93 52 35	92 32 48	91 13 5	89 53 27
	Sun	E.	127 30 41	126 9 10	124 47 43	123 26 20
22	Spica	W.	102 10 51	103 39 36	105 8 19	106 37 3
	Antares	W.	56 18 35	57 47 24	59 16 12	60 44 59
	a Pegasi	E.	51 4 5	49 41 56	48 20 4	46 58 32
	Venus	E.	83 16 9	81 56 48	80 37 29	79 18 11
	Sun	E.	116 39 59	115 18 48	113 57 36	112 36 25
23	Antares	W.	68 9 9	69 38 5	71 7 5	72 36 9
	a Pegasi	E.	40 16 30	38 57 28	37 39 0	36 21 10
	Venus	E.	72 41 35	71 22 11	70 2 45	68 43 15
	Sun	E.	105 50 10	104 28 48	103 7 21	101 45 51
24	Antares	W.	80 2 48	81 32 28	83 2 16	84 32 13
	Venus	E.	62 4 39	60 44 38	59 24 31	58 4 17
	Sun	E.	94 56 56	93 34 48	92 12 32	90 50 8
25	Antares	W.	92 4 29	93 35 31	95 6 45	96 38 13
	a Aquilæ	W.	47 10 8	48 14 58	49 21 1	50 28 12
	Venus	E.	51 20 59	49 59 51	48 38 33	47 17 4
	Sun	E.	83 55 34	82 32 5	81 8 23	79 44 28
26	Antares	W.	104 19 11	105 52 11	107 25 28	108 59 2
	a Aquilæ	W.	56 19 30	57 32 31	58 46 23	60 1 2
	Fomalhaut	W.	30 39 26	31 44 26	32 51 40	34 0 57
	Venus	E.	40 26 51	39 4 14	37 41 25	36 18 24
	Sun	E.	72 41 18	71 15 52	69 50 10	68 24 11
27	*a* Aquilæ	W.	66 25 21	67 44 15	69 3 47	70 23 56
	Fomalhaut	W.	40 12 59	41 31 43	42 51 40	44 12 46
	Venus	E.	29 20 44	27 56 46	26 32 44	25 8 39
	Sun	E.	61 9 43	59 41 52	58 13 41	56 45 10
28	*a* Aquilæ	W.	77 13 11	78 36 36	80 0 31	81 24 54
	Fomalhaut	W.	51 13 28	52 40 18	54 7 57	55 36 22
	a Pegasi	W.	29 32 49	30 52 55	32 14 51	33 38 29
	Sun	E.	49 17 23	47 46 46	46 15 48	44 44 30
29	*a* Aquilæ	W.	88 33 15	90 0 4	91 27 14	92 54 42
	Fomalhaut	W.	63 9 5	64 41 34	66 14 39	67 48 19
	a Pegasi	W.	40 57 20	42 28 33	44 0 44	45 33 51
	Sun	E.	37 2 43	35 29 21	33 55 41	32 21 43

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
20	Spica	W.	84° 21′ 37″	85° 51′ 12″	87° 20′ 40″	88° 50′ 2″
	Antares	W.	38 28 35	39 58 13	41 27 45	42 57 10
	Fomalhaut	E.	47 47 28	46 30 5	45 13 23	43 57 24
	α Pegasi	E.	67 49 24	66 24 24	64 59 37	63 35 2
	Venus	E.	99 12 44	97 52 32	96 32 27	95 12 28
	Sun	E.	132 57 30	131 35 41	130 13 56	128 52 17
21	Spica	W.	96 15 32	97 44 26	99 13 17	100 42 5
	Antares	W.	50 23 1	51 51 58	53 20 53	54 49 45
	Fomalhaut	E.	37 50 13	36 39 50	35 30 41	34 22 53
	α Pegasi	E.	56 35 27	55 12 13	53 49 15	52 26 32
	Venus	E.	88 33 53	87 14 22	85 54 55	84 35 31
	Sun	E.	122 4 59	120 43 41	119 22 26	118 1 12
22	Spica	W.	108 5 46	109 34 29	111 3 14	112 32 1
	Antares	W.	62 13 46	63 42 35	65 11 24	66 40 15
	α Pegasi	E.	45 37 20	44 16 30	42 56 4	41 36 3
	Venus	E.	77 58 54	76 39 36	75 20 17	74 0 57
	Sun	E.	111 15 13	109 54 1	108 32 46	107 11 29
23	Antares	W.	74 5 17	75 34 30	77 3 49	78 33 15
	α Pegasi	E.	35 4 2	33 47 40	32 32 11	31 17 41
	Venus	E.	67 23 41	66 4 3	64 44 21	63 24 33
	Sun	E.	100 24 16	99 2 35	97 40 49	96 18 56
24	Antares	W.	86 2 20	87 32 36	89 3 2	90 33 40
	Venus	E.	56 43 55	55 23 24	54 2 45	52 41 57
	Sun	E.	89 27 34	88 4 50	86 41 56	85 18 51
25	Antares	W.	98 9 55	99 41 51	101 14 2	102 46 29
	α Aquilæ	W.	51 36 29	52 45 48	53 56 6	55 7 21
	Venus	E.	45 55 25	44 33 34	43 11 31	41 49 17
	Sun	E.	78 20 20	76 55 57	75 31 19	74 6 26
26	Antares	W.	110 32 54	112 7 5	113 41 35	115 16 25
	α Aquilæ	W.	61 16 27	62 32 37	63 49 31	65 7 6
	Fomalhaut	W.	35 12 7	36 25 2	37 39 33	38 55 34
	Venus	E.	34 55 12	33 31 49	32 8 17	30 44 34
	Sun	E.	66 57 55	65 31 20	64 4 27	62 37 14
27	α Aquilæ	W.	71 44 41	73 5 59	74 27 51	75 50 15
	Fomalhaut	W.	45 34 57	46 58 10	48 22 21	49 47 28
	Venus	E.	23 44 34	22 20 33	20 56 42	19 33 7
	Sun	E.	55 16 18	53 47 6	52 17 32	50 47 38
28	α Aquilæ	W.	82 49 45	84 15 1	85 40 42	87 6 47
	Fomalhaut	W.	57 5 32	58 35 25	60 5 59	61 37 13
	α Pegasi	W.	35 3 39	36 30 13	37 58 5	39 27 9
	Sun	E.	43 12 50	41 40 48	40 8 27	38 35 45
29	α Aquilæ	W.	94 22 28	95 50 30	97 18 47	98 47 16
	Fomalhaut	W.	69 22 32	70 57 17	72 32 32	74 8 18
	α Pegasi	W.	47 7 48	48 42 34	50 18 7	51 54 23
	Sun	E.	30 47 28	29 12 57	27 38 12	26 3 15

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
3	Sun	W.	30 27 5	32 9 19	33 51 37	35 33 59
	Regulus	E.	45 18 32	43 27 46	41 37 3	39 46 23
	Spica	E.	99 21 30	97 30 48	95 40 8	93 49 32
4	Sun	W.	44 5 48	45 48 1	47 30 7	49 12 8
	Regulus	E.	30 34 18	28 44 14	26 54 18	25 4 31
	Spica	E.	84 37 41	82 47 38	80 57 44	79 7 59
5	Sun	W.	57 40 3	59 21 8	61 2 2	62 42 44
	Pollux	W.	21 21 39	23 8 32	24 55 29	26 42 25
	Spica	E.	70 1 46	68 13 6	66 24 38	64 36 24
	Antares	E.	115 53 30	114 4 44	112 16 10	110 27 50
6	Sun	W.	71 3 0	72 42 22	74 21 29	76 0 22
	Pollux	W.	35 35 40	37 21 52	39 7 52	40 53 40
	Saturn	W.	17 49 32	19 35 44	21 21 42	23 7 25
	Spica	E.	55 38 42	53 51 53	52 5 21	50 19 3
	Antares	E.	101 29 33	99 42 37	97 55 56	96 9 30
7	Sun	W.	84 11 0	85 48 22	87 25 27	89 2 18
	Pollux	W.	49 39 23	51 23 50	53 8 2	54 51 59
	Saturn	W.	31 52 8	33 36 18	35 20 11	37 3 49
	Regulus	W.	12 37 24	14 22 2	16 6 27	17 50 38
	Spica	E.	41 31 36	39 46 55	38 2 32	36 18 25
	Antares	E.	87 21 13	85 36 20	83 51 44	82 7 23
8	Sun	W.	97 2 32	98 37 48	100 12 49	101 47 34
	Pollux	W.	63 28 1	65 10 29	66 52 41	68 34 38
	Saturn	W.	45 37 59	47 20 2	49 1 49	50 43 21
	Regulus	W.	26 27 55	28 10 37	29 53 4	31 35 16
	Spica	E.	27 42 11	25 59 51	24 17 48	22 36 5
	Antares	E.	73 29 38	71 46 53	70 4 23	68 22 8
	α Aquilæ	E.	122 1 4	120 39 20	119 17 8	117 54 33
9	Sun	W.	109 37 24	111 10 37	112 43 35	114 16 18
	Pollux	W.	77 0 41	78 41 10	80 21 24	82 1 23
	Saturn	W.	59 7 8	60 47 9	62 26 55	64 6 26
	Regulus	W.	40 2 29	41 43 12	43 23 39	45 3 52
	Antares	E.	59 54 44	58 14 0	56 33 31	54 53 17
	α Aquilæ	E.	110 57 21	109 33 20	108 9 12	106 44 59
10	Sun	W.	121 56 14	123 27 30	124 58 32	126 29 20
	Pollux	W.	90 17 49	91 56 25	93 34 48	95 12 57
	Saturn	W.	72 20 27	73 58 33	75 36 26	77 14 6
	Regulus	W.	53 21 25	55 0 15	56 38 51	58 17 14
	Antares	E.	46 35 37	44 56 47	43 18 10	41 39 47
	α Aquilæ	E.	99 43 36	98 19 25	96 55 18	95 31 17
	Fomalhaut	E.	125 30 41	124 2 34	122 34 16	121 5 49
11	Pollux	W.	103 20 25	104 57 17	106 33 55	108 10 22
	Saturn	W.	85 19 8	86 55 30	88 31 40	90 7 38
	Regulus	W.	66 25 52	68 2 57	69 39 51	71 16 32
	Spica	W.	12 34 29	14 10 6	15 45 48	17 21 31
	Antares	E.	33 31 5	31 53 59	30 17 5	28 40 24

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
3	Sun	W.	37 16 23	38 58 48	40 41 11	42 23 31
	Regulus	E.	37 55 47	36 5 16	34 14 50	32 24 30
	Spica	E.	91 58 59	90 8 30	88 18 7	86 27 51
4	Sun	W.	50 54 0	52 35 45	54 17 21	55 58 47
	Regulus	E.	23 14 55	21 25 29	19 36 15	17 47 14
	Spica	E.	77 18 23	75 28 57	73 39 42	71 50 38
5	Sun	W.	64 23 13	66 3 30	67 43 34	69 23 24
	Pollux	W.	28 29 18	30 16 6	32 2 46	33 49 18
	Spica	E.	62 48 23	61 0 36	59 13 3	57 25 45
	Antares	E.	108 39 43	106 51 49	105 4 9	103 16 44
6	Sun	W.	77 39 1	79 17 23	80 55 31	82 33 24
	Pollux	W.	42 39 16	44 24 38	46 9 47	47 54 43
	Saturn	W.	24 52 53	26 38 5	28 23 2	30 7 43
	Spica	E.	48 33 1	46 47 15	45 1 46	43 16 32
	Antares	E.	94 23 20	92 37 25	90 51 45	89 6 21
7	Sun	W.	90 38 52	92 15 10	93 51 13	95 27 0
	Pollux	W.	56 35 42	58 19 9	60 2 22	61 45 19
	Saturn	W.	38 47 11	40 30 17	42 13 7	43 55 41
	Regulus	W.	19 34 35	21 18 18	23 1 45	24 44 58
	Spica	E.	34 34 36	32 51 3	31 7 48	29 24 51
	Antares	E.	80 23 19	78 39 30	76 55 57	75 12 40
8	Sun	W.	103 22 3	104 56 17	106 30 14	108 3 57
	Pollux	W.	70 16 21	71 57 48	73 39 0	75 19 58
	Saturn	W.	52 24 37	54 5 37	55 46 23	57 26 53
	Regulus	W.	33 17 13	34 58 54	36 40 21	38 21 32
	Spica	E.	20 54 42	19 13 41	17 33 3	15 52 50
	Antares	E.	66 40 9	64 58 25	63 16 56	61 35 43
	α Aquilæ	E.	116 31 37	115 8 24	113 44 55	112 21 13
9	Sun	W.	115 48 47	117 21 0	118 52 59	120 24 44
	Pollux	W.	83 41 8	85 20 40	86 59 57	88 39 0
	Saturn	W.	65 45 42	67 24 45	69 3 33	70 42 7
	Regulus	W.	46 43 51	48 23 36	50 3 6	51 42 23
	Antares	E.	53 13 16	51 33 31	49 53 59	48 14 41
	α Aquilæ	E.	105 20 44	103 56 26	102 32 8	101 7 51
10	Sun	W.	127 59 54	129 30 14	131 0 19	132 30 12
	Pollux	W.	96 50 52	98 28 35	100 6 5	101 43 21
	Saturn	W.	78 51 32	80 28 46	82 5 46	83 42 33
	Regulus	W.	59 55 23	61 33 20	63 11 3	64 48 34
	Antares	E.	40 1 37	38 23 40	36 45 56	35 8 24
	α Aquilæ	E.	94 7 23	92 43 37	91 19 59	89 56 32
	Fomalhaut	E.	119 37 15	118 8 36	116 39 52	115 11 5
11	Pollux	W.	109 46 36	111 22 37	112 58 27	114 34 5
	Saturn	W.	91 43 23	93 18 57	94 54 18	96 29 29
	Regulus	W.	72 53 1	74 29 19	76 5 24	77 41 18
	Spica	W.	18 57 12	20 32 49	22 8 20	23 43 43
	Antares	E.	27 3 54	25 27 36	23 51 31	22 15 36

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
11	*a* Aquilæ	E.	88 33 15	87 10 10	85 47 17	84 24 38
	Fomalhaut	E.	113 42 17	112 13 28	110 44 39	109 15 52
12	Pollux	W.	116 9 30	117 44 44	119 19 46	120 54 36
	Saturn	W.	98 4 27	99 39 14	101 13 49	102 48 13
	Regulus	W.	79 17 0	80 52 31	82 27 51	84 2 59
	Spica	W.	25 18 59	26 54 6	28 29 5	30 3 54
	a Aquilæ	E.	77 35 21	76 14 24	74 53 47	73 33 32
	Fomalhaut	E.	101 52 46	100 24 23	98 56 7	97 27 58
	a Pegasi	E.	124 6 29	122 36 55	121 7 20	119 37 44
13	Saturn	W.	110 37 30	112 10 49	113 43 58	115 16 56
	Regulus	W.	91 55 57	93 30 1	95 3 54	96 37 37
	Spica	W.	37 55 40	39 29 33	41 3 15	42 36 49
	a Aquilæ	E.	66 58 23	65 40 43	64 23 35	63 6 59
	Fomalhaut	E.	90 9 13	88 41 56	87 14 48	85 47 51
	a Pegasi	E.	112 10 4	110 40 41	109 11 22	107 42 8
14	Regulus	W.	104 23 40	105 56 23	107 28 56	109 1 20
	Spica	W.	50 22 11	51 54 48	53 27 15	54 59 32
	a Aquilæ	E.	56 53 12	55 40 32	54 28 40	53 17 37
	Fomalhaut	E.	78 36 4	77 10 21	75 44 52	74 19 37
	a Pegasi	E.	100 17 22	98 48 44	97 20 13	95 51 49
15	Regulus	W.	116 41 2	118 12 32	119 43 53	121 15 5
	Spica	W.	62 38 47	64 10 12	65 41 28	67 12 36
	Antares	W.	16 44 47	18 16 17	19 47 37	21 18 50
	a Aquilæ	E.	47 36 49	46 31 57	45 28 22	44 26 8
	Fomalhaut	E.	67 17 20	65 53 44	64 30 27	63 7 30
	a Pegasi	E.	88 31 50	87 4 15	85 36 49	84 9 32
16	Spica	W.	74 46 16	76 16 37	77 46 51	79 16 58
	Antares	W.	28 52 54	30 23 19	31 53 38	33 23 49
	Fomalhaut	E.	56 18 10	54 57 31	53 37 20	52 17 38
	a Pegasi	E.	76 55 28	75 29 9	74 3 0	72 37 1
	a Arietis	E.	119 7 8	117 37 9	116 7 17	114 37 32
17	Spica	W.	86 45 54	88 15 23	89 44 46	91 14 4
	Antares	W.	40 53 7	42 22 40	43 52 8	45 21 31
	Fomalhaut	E.	45 47 25	44 31 18	43 15 57	42 1 24
	a Pegasi	E.	65 29 49	64 4 57	62 40 18	61 15 51
	a Arietis	E.	107 10 13	105 41 2	104 11 56	102 42 56
18	Spica	W.	98 39 27	100 8 20	101 37 9	103 5 56
	Antares	W.	52 47 16	54 16 13	55 45 7	57 13 59
	Fomalhaut	E.	36 3 19	34 55 16	33 48 40	32 43 38
	a Pegasi	E.	54 16 59	52 53 57	51 31 12	50 8 44
	a Arietis	E.	95 18 56	93 50 19	92 21 46	90 53 14
	Venus	E.	119 4 23	117 45 10	116 25 59	115 6 50
19	Spica	W.	110 29 21	111 57 58	113 26 35	114 55 13
	Antares	W.	64 37 49	66 6 31	67 35 14	69 3 57
	a Pegasi	E.	43 21 28	42 1 12	40 41 24	39 22 7
	a Arietis	E.	83 31 7	82 2 45	80 34 24	79 6 2

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
11	α Aquilæ	E.	83 2 14	81 40 5	80 18 13	78 56 37
	Fomalhaut	E.	107 47 7	106 18 25	104 49 48	103 21 14
12	Pollux	W.	122 29 14	124 3 41	125 37 56	127 12 0
	Saturn	W.	104 22 26	105 56 29	107 30 20	109 4 0
	Regulus	W.	85 37 56	87 12 43	88 47 18	90 21 43
	Spica	W.	31 38 34	33 13 5	34 47 26	36 21 38
	α Aquilæ	E.	72 13 40	70 54 11	69 35 8	68 16 31
	Fomalhaut	E.	95 59 56	94 32 2	93 4 17	91 36 41
	α Pegasi	E.	118 8 8	116 38 33	115 9 1	113 39 31
13	Saturn	W.	116 49 44	118 22 22	119 54 50	121 27 8
	Regulus	W.	98 11 9	99 44 32	101 17 45	102 50 47
	Spica	W.	44 10 12	45 43 26	47 16 31	48 49 26
	α Aquilæ	E.	61 50 58	60 35 32	59 20 44	58 6 37
	Fomalhaut	E.	84 21 6	82 54 32	81 28 10	80 2 0
	α Pegasi	E.	106 12 59	104 43 56	103 14 58	101 46 7
14	Regulus	W.	110 33 35	112 5 40	113 37 37	115 9 24
	Spica	W.	56 31 41	58 3 41	59 35 32	61 7 14
	α Aquilæ	E.	52 7 28	50 58 15	49 50 2	48 42 52
	Fomalhaut	E.	72 54 37	71 29 53	70 5 25	68 41 14
	α Pegasi	E.	94 23 34	92 55 26	91 27 26	89 59 34
15	Regulus	W.	122 46 9	124 17 5	125 47 53	127 18 33
	Spica	W.	68 43 36	70 14 28	71 45 12	73 15 48
	Antares	W.	22 49 55	24 20 51	25 51 40	27 22 21
	α Aquilæ	E.	43 25 19	42 26 2	41 28 23	40 32 27
	Fomalhaut	E.	61 44 53	60 22 37	59 0 44	57 39 15
	α Pegasi	E.	82 42 25	81 15 26	79 48 37	78 21 58
16	Spica	W.	80 46 58	82 16 51	83 46 38	85 16 19
	Antares	W.	34 53 53	36 23 51	37 53 42	39 23 27
	Fomalhaut	E.	50 58 26	49 39 47	48 21 42	47 4 14
	α Pegasi	E.	71 11 12	69 45 35	68 20 8	66 54 53
	α Arietis	E.	113 7 52	111 38 19	110 8 51	108 39 29
17	Spica	W.	92 43 18	94 12 26	95 41 31	97 10 31
	Antares	W.	46 50 49	48 20 2	49 49 10	51 18 15
	Fomalhaut	E.	40 47 44	39 35 0	38 23 18	37 12 42
	α Pegasi	E.	59 51 37	58 27 36	57 3 49	55 40 16
	α Arietis	E.	101 13 59	99 45 8	98 16 20	96 47 36
18	Spica	W.	104 34 41	106 3 23	107 32 3	109 0 43
	Antares	W.	58 42 48	60 11 36	61 40 21	63 9 5
	Fomalhaut	E.	31 40 21	30 38 59	29 39 43	28 42 46
	α Pegasi	E.	48 46 35	47 24 45	46 3 16	44 42 10
	α Arietis	E.	89 24 46	87 56 19	86 27 54	84 59 30
	Venus	E.	113 47 42	112 28 35	111 9 30	109 50 25
19	Spica	W.	116 23 51	117 52 30	119 21 11	120 49 53
	Antares	W.	70 32 41	72 1 26	73 30 12	74 59 1
	α Pegasi	E.	38 3 25	36 45 20	35 27 56	34 11 18
	α Arietis	E.	77 37 39	76 9 15	74 40 51	73 12 24

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
19	Venus	E.	108 31 20	107 12 15	105 53 10	104 34 4
	Sun	E.	135 11 26	133 50 20	132 29 12	131 8 3
20	Antares	W.	76 27 52	77 56 46	79 25 44	80 54 46
	α Pegasi	E.	32 55 32	31 40 44	30 27 0	29 14 28
	α Arietis	E.	71 43 55	70 15 24	68 46 49	67 18 11
	Venus	E.	97 58 7	96 38 48	95 19 25	93 59 57
	Sun	E.	124 21 44	123 0 18	121 38 49	120 17 15
21	Antares	W.	88 21 11	89 50 48	91 20 31	92 50 23
	α Aquilæ	W.	44 25 43	45 26 51	46 29 16	47 32 55
	α Arietis	E.	59 53 53	58 24 45	56 55 29	55 26 7
	Venus	E.	87 21 21	86 1 19	84 41 9	83 20 51
	Sun	E.	113 27 59	112 5 47	110 43 28	109 21 0
22	Antares	W.	100 22 4	101 52 57	103 24 1	104 55 18
	α Aquilæ	W.	53 7 21	54 17 7	55 27 44	56 39 10
	Fomalhaut	W.	28 15 19	29 12 24	30 12 9	31 14 21
	α Arietis	E.	47 57 14	46 27 0	44 56 37	43 26 3
	Venus	E.	76 37 1	75 15 44	73 54 15	72 32 34
	Sun	E.	102 26 15	101 2 45	99 39 3	98 15 8
23	Antares	W.	112 35 11	114 7 56	115 40 57	117 14 15
	α Aquilæ	W.	62 47 30	64 3 13	65 19 33	66 36 30
	Fomalhaut	W.	36 55 25	38 8 38	39 23 15	40 39 9
	α Arietis	E.	35 50 30	34 18 50	32 46 59	31 14 57
	Venus	E.	65 40 46	64 17 41	62 54 20	61 30 43
	Sun	E.	91 12 4	89 46 41	88 21 2	86 55 5
24	α Aquilæ	W.	73 9 47	74 30 2	75 50 48	77 12 3
	Fomalhaut	W.	47 15 32	48 37 47	50 0 54	51 24 51
	α Pegasi	W.	25 46 43	26 59 4	28 13 49	29 30 41
	α Arietis	E.	23 32 34	21 59 49	20 27 5	18 54 29
	Venus	E.	54 28 19	53 2 55	51 37 13	50 11 11
	Sun	E.	79 40 48	78 12 58	76 44 48	75 16 16
25	α Aquilæ	W.	84 5 13	85 29 9	86 53 30	88 18 13
	Fomalhaut	W.	58 36 11	60 4 35	61 33 39	63 3 21
	α Pegasi	W.	36 20 39	37 46 50	39 14 10	40 42 36
	Venus	E.	42 56 5	41 28 3	39 59 41	38 30 59
	Sun	E.	67 48 7	66 17 20	64 46 9	63 14 34
26	α Aquilæ	W.	95 27 11	96 53 56	98 20 57	99 48 12
	Fomalhaut	W.	70 41 3	72 14 19	73 48 8	75 22 29
	α Pegasi	W.	48 19 0	49 52 49	51 27 24	53 2 42
	Venus	E.	31 2 44	29 32 13	28 1 28	26 30 30
	Sun	E.	55 30 31	53 56 27	52 21 58	50 47 4
27	α Aquilæ	W.	107 7 23	108 35 34	110 3 48	111 32 2
	Fomalhaut	W.	83 21 45	84 59 1	86 36 43	88 14 50
	α Pegasi	W.	61 9 25	62 48 38	64 28 25	66 8 46
	Sun	E.	42 46 16	41 8 52	39 31 4	37 52 53

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
19	Venus	E.	103 14 57	101 55 48	100 36 37	99 17 23
	Sun	E.	129 46 52	128 25 40	127 4 24	125 43 6
20	Antares	W.	82 23 52	83 53 3	85 22 19	86 51 42
	a Pegasi	E.	28 3 20	26 53 46	25 45 59	24 40 15
	a Arietis	E.	65 49 29	64 20 43	62 51 52	61 22 55
	Venus	E.	92 40 25	91 20 48	90 1 5	88 41 16
	Sun	E.	118 55 36	117 33 51	116 12 0	114 50 3
21	Antares	W.	94 20 24	95 50 34	97 20 53	98 51 23
	a Aquilæ	W.	48 37 43	49 43 37	50 50 33	51 58 29
	a Arietis	E.	53 56 37	52 27 0	50 57 14	49 27 19
	Venus	E.	82 0 24	80 39 48	79 19 3	77 58 7
	Sun	E.	107 58 23	106 35 37	105 12 40	103 49 33
22	Antares	W.	106 26 48	107 58 32	109 30 30	111 2 43
	a Aquilæ	W.	57 51 23	59 4 21	60 18 3	61 32 26
	Fomalhaut	W.	32 18 46	33 25 14	34 33 36	35 43 42
	a Arietis	E.	41 55 18	40 24 23	38 53 17	37 21 59
	Venus	E.	71 10 40	69 48 33	68 26 12	67 3 36
	Sun	E.	96 51 0	95 26 38	94 2 2	92 37 11
23	Antares	W.	118 47 50	120 21 44	121 55 56	123 30 27
	a Aquilæ	W.	67 54 2	69 12 9	70 30 49	71 50 2
	Fomalhaut	W.	41 56 16	43 14 32	44 33 52	45 54 13
	a Arietis	E.	29 42 45	28 10 23	26 37 53	25 5 16
	Venus	E.	60 6 49	58 42 38	57 18 10	55 53 23
	Sun	E.	85 28 51	84 2 19	82 35 28	81 8 18
24	*a* Aquilæ	W.	78 33 47	79 55 58	81 18 37	82 41 42
	Fomalhaut	W.	52 49 37	54 15 9	55 41 27	57 8 27
	a Pegasi	W.	30 49 28	32 10 0	33 32 8	34 55 43
	a Arietis	E.	17 22 5	15 50 4	14 18 43	12 48 21
	Venus	E.	48 44 50	47 18 9	45 51 8	44 23 46
	Sun	E.	73 47 23	72 18 8	70 48 30	69 18 30
25	*a* Aquilæ	W.	89 43 20	91 8 47	92 34 36	94 0 44
	Fomalhaut	W.	64 33 42	66 4 39	67 36 12	69 8 21
	a Pegasi	W.	42 12 3	43 42 27	45 13 47	46 45 58
	Venus	E.	37 1 57	35 32 36	34 2 56	32 32 58
	Sun	E.	61 42 36	60 10 12	58 37 23	57 4 10
26	*a* Aquilæ	W.	101 15 42	102 43 23	104 11 15	105 39 16
	Fomalhaut	W.	76 57 21	78 32 43	80 8 35	81 44 56
	a Pegasi	W.	54 38 44	56 15 26	57 52 48	59 30 48
	Venus	E.	24 59 23	23 28 10	21 56 54	20 25 42
	Sun	E.	49 11 45	47 36 0	45 59 50	44 23 15
27	*a* Aquilæ	W.	113 0 13	114 28 18	115 56 14	117 23 58
	Fomalhaut	W.	89 53 21	91 32 15	93 11 32	94 51 9
	a Pegasi	W.	67 49 40	69 31 6	71 13 1	72 55 26
	Sun	E.	36 14 19	34 35 23	32 56 5	31 16 27

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
2	Sun	W.	26° 39′ 45″	28° 24′ 27″	30° 9′ 6″	31° 53′ 40″
	Spica	E.	75 17 41	73 25 2	71 32 32	69 40 12
	Antares	E.	121 9 30	119 16 44	117 24 7	115 31 41
3	Sun	W.	40 34 19	42 17 52	44 1 10	45 44 14
	Spica	E.	60 21 40	58 30 41	56 39 59	54 49 33
	Antares	E.	106 12 31	104 21 24	102 30 33	100 39 58
4	Sun	W.	54 15 19	55 56 37	57 37 36	59 18 15
	Saturn	W.	24 49 5	26 36 56	28 24 26	30 11 35
	Spica	E.	45 42 3	43 53 33	42 5 24	40 17 36
	Antares	E.	91 31 36	89 42 53	87 54 31	86 6 29
5	Sun	W.	67 36 19	69 14 52	70 53 3	72 30 53
	Saturn	W.	39 2 2	40 47 2	42 31 40	44 15 56
	Regulus	W.	22 46 45	24 32 31	26 17 56	28 3 0
	Spica	E.	31 24 16	29 38 46	27 53 41	26 9 2
	Antares	E.	77 11 39	75 25 47	73 40 16	71 55 7
6	Sun	W.	80 34 35	82 10 14	83 45 32	85 20 28
	Saturn	W.	52 51 44	54 33 48	56 15 30	57 56 50
	Regulus	W.	36 42 53	38 25 47	40 8 20	41 50 31
	Spica	E.	17 32 31	15 50 47	14 9 40	12 29 18
	Antares	E.	63 14 54	61 31 58	59 49 23	58 7 9
	α Aquilæ	E.	113 50 4	112 24 50	110 59 31	109 34 9
7	Sun	W.	93 9 56	94 42 49	96 15 21	97 47 34
	Saturn	W.	66 18 16	67 57 31	69 36 26	71 15 2
	Regulus	W.	50 16 12	51 56 19	53 36 6	55 15 33
	Antares	E.	49 41 19	48 1 11	46 21 22	44 41 53
	α Aquilæ	E.	102 27 29	101 2 23	99 37 24	98 12 33
8	Sun	W.	105 23 55	106 54 17	108 24 21	109 54 8
	Saturn	W.	79 23 15	80 59 59	82 36 26	84 12 35
	Regulus	W.	63 28 7	65 5 44	66 43 2	68 20 4
	Antares	E.	36 29 14	34 51 37	33 14 17	31 37 15
	α Aquilæ	E.	91 11 7	89 47 29	88 24 6	87 0 59
	Fomalhaut	E.	116 20 24	114 51 37	113 22 53	111 54 12
9	Sun	W.	117 18 59	118 47 11	120 15 8	121 42 50
	Saturn	W.	92 9 17	93 43 51	95 18 11	96 52 16
	Regulus	W.	76 21 10	77 56 37	79 31 49	81 6 47
	Spica	W.	22 24 51	23 59 43	25 34 25	27 8 56
	Antares	E.	23 36 7	22 0 40	20 25 28	18 50 31
	α Aquilæ	E.	80 9 49	78 48 33	77 27 37	76 7 4
	Fomalhaut	E.	104 32 10	103 4 7	101 36 11	100 8 24
10	Sun	W.	128 57 57	130 24 20	131 50 30	133 16 29
	Saturn	W.	104 39 17	106 12 4	107 44 38	109 17 0
	Regulus	W.	88 58 13	90 31 53	92 5 20	93 38 36
	Spica	W.	34 58 45	36 32 10	38 5 24	39 38 27
	α Aquilæ	E.	69 30 18	68 12 15	66 54 41	65 37 37
	Fomalhaut	E.	92 51 49	91 24 59	89 58 21	88 31 53
	α Pegasi	E.	115 1 21	113 32 27	112 3 38	110 34 54

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
2	Sun	W.	33 38 7	35 22 26	37 6 35	38 50 33
	Spica	E.	67 48 3	65 56 7	64 4 24	62 12 55
	Antares	E.	113 39 25	111 47 21	109 55 31	108 3 54
3	Sun	W.	47 27 1	49 9 32	50 51 46	52 33 42
	Spica	E.	52 59 25	51 9 36	49 20 5	47 30 54
	Antares	E.	98 49 41	96 59 41	95 10 0	93 20 38
4	Sun	W.	60 58 33	62 38 31	64 18 8	65 57 24
	Saturn	W.	31 58 23	33 44 50	35 30 56	37 16 40
	Spica	E.	38 30 10	36 43 7	34 56 26	33 10 9
	Antares	E.	84 18 48	82 31 29	80 44 31	78 57 54
5	Sun	W.	74 8 21	75 45 27	77 22 11	78 58 34
	Saturn	W.	45 59 50	47 43 21	49 26 31	51 9 19
	Regulus	W.	29 47 42	31 32 2	33 16 1	34 59 38
	Spica	E.	24 24 48	22 41 1	20 57 41	19 14 50
	Antares	E.	70 10 20	68 25 56	66 41 53	64 58 13
6	Sun	W.	86 55 3	88 29 18	90 3 11	91 36 44
	Saturn	W.	59 37 49	61 18 27	62 58 44	64 38 40
	Regulus	W.	43 32 20	45 13 49	46 54 57	48 35 45
	Spica	E.	10 49 51	9 11 37	-	- - -
	Antares	E.	56 25 17	54 43 47	53 2 37	51 21 48
	α Aquilæ	E.	108 8 45	106 43 22	105 18 0	103 52 42
7	Sun	W.	99 19 28	100 51 2	102 22 18	103 53 16
	Saturn	W.	72 53 18	74 31 15	76 8 54	77 46 14
	Regulus	W.	56 54 41	58 33 31	60 12 1	61 50 13
	Antares	E.	43 2 44	41 23 53	39 45 22	38 7 9
	α Aquilæ	E.	96 47 53	95 23 23	93 59 4	92 34 59
8	Sun	W.	111 23 39	112 52 53	114 21 51	115 50 33
	Saturn	W.	85 48 28	87 24 4	88 59 24	90 34 28
	Regulus	W.	69 56 49	71 33 18	73 9 31	74 45 28
	Antares	E.	30 0 29	28 23 59	26 47 46	25 11 49
	α Aquilæ	E.	85 38 9	84 15 36	82 53 21	81 31 25
	Fomalhaut	E.	110 25 36	108 57 5	107 28 40	106 0 21
9	Sun	W.	123 10 18	124 37 33	126 4 34	127 31 22
	Saturn	W.	98 26 7	99 59 44	101 33 8	103 6 19
	Regulus	W.	82 41 30	84 16 1	85 50 18	87 24 22
	Spica	W.	28 43 16	30 17 25	31 51 23	33 25 10
	Antares	E.	17 15 47	15 41 18	14 7 2	12 33 0
	α Aquilæ	E.	74 46 54	73 27 7	72 7 45	70 48 48
	Fomalhaut	E.	98 40 46	97 13 18	95 45 58	94 18 48
10	Sun	W.	134 42 15	136 7 51	137 33 15	138 58 28
	Saturn	W.	110 49 12	112 21 12	113 53 1	115 24 40
	Regulus	W.	95 11 40	96 44 33	98 17 16	99 49 48
	Spica	W.	41 11 19	42 44 2	44 16 34	45 48 57
	α Aquilæ	E.	64 21 4	63 5 4	61 49 39	60 34 49
	Fomalhaut	E.	87 5 36	85 39 31	84 13 37	82 47 55
	α Pegasi	E.	109 6 15	107 37 42	106 9 15	104 40 54

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
11	Regulus	W.	101 22 10	102 54 22	104 26 24	105 58 18
	Spica	W.	47 21 10	48 53 13	50 25 8	51 56 54
	a Aquilæ	E.	59 20 37	58 7 4	56 54 13	55 42 5
	Fomalhaut	E.	81 22 25	79 57 7	78 32 2	77 7 11
	a Pegasi	E.	103 12 39	101 44 31	100 16 29	98 48 33
12	Spica	W.	59 33 38	61 4 35	62 35 25	64 6 8
	Antares	W.	13 39 20	15 10 22	16 41 16	18 12 4
	a Aquilæ	E.	49 53 53	48 47 5	47 41 22	46 36 48
	Fomalhaut	E.	70 6 18	68 42 52	67 19 43	65 56 50
	a Pegasi	E.	91 30 36	90 3 22	88 36 15	87 9 15
13	Spica	W.	71 38 3	73 8 8	74 38 7	76 8 0
	Antares	W.	25 44 25	27 14 34	28 44 38	30 14 37
	Fomalhaut	E.	59 7 0	57 46 3	56 25 29	55 5 19
	a Pegasi	E.	79 56 6	78 29 51	77 3 45	75 37 46
	a Arietis	E.	122 14 58	120 45 15	119 15 37	117 46 4
14	Spica	W.	83 36 13	85 5 37	86 34 58	88 4 14
	Antares	W.	37 43 14	39 12 43	40 42 9	42 11 30
	Fomalhaut	E.	48 31 26	47 14 15	45 57 43	44 41 50
	a Pegasi	E.	68 30 1	67 4 55	65 39 58	64 15 12
	a Arietis	E.	110 19 24	108 50 16	107 21 12	105 52 12
15	Spica	W.	95 29 45	96 58 41	98 27 35	99 56 27
	Antares	W.	49 37 26	51 6 28	52 35 27	54 4 24
	Fomalhaut	E.	38 34 34	37 24 3	36 14 43	35 6 41
	a Pegasi	E.	57 14 4	55 50 27	54 27 3	53 3 54
	a Arietis	E.	98 27 59	96 59 16	95 30 37	94 1 59
16	Spica	W.	107 20 18	108 48 59	110 17 40	111 46 21
	Antares	W.	61 28 41	62 57 28	64 26 15	65 55 1
	a Pegasi	E.	46 12 20	44 51 0	43 30 4	42 9 33
	a Arietis	E.	86 39 19	85 10 51	83 42 24	82 13 57
	Aldebaran	E.	118 17 39	116 50 45	115 23 48	113 56 49
17	Antares	W.	73 18 53	74 47 42	76 16 32	77 45 24
	a Pegasi	E.	35 34 57	34 18 2	33 1 58	31 46 50
	a Arietis	E.	74 51 45	73 23 17	71 54 48	70 26 18
	Aldebaran	E.	106 41 22	105 14 10	103 46 54	102 19 36
18	Antares	W.	85 10 19	86 39 27	88 8 40	89 37 57
	a Aquilæ	W.	42 14 22	43 12 19	44 11 43	45 12 27
	a Arietis	E.	63 3 18	61 34 34	60 5 47	58 36 56
	Aldebaran	E.	95 2 18	93 34 39	92 6 56	90 39 8
19	Antares	W.	97 5 40	98 35 32	100 5 30	101 35 36
	a Aquilæ	W.	50 33 46	51 41 6	52 49 19	53 58 22
	Fomalhaut	W.	26 28 40	27 18 39	28 11 45	29 7 43
	a Arietis	E.	51 11 37	49 42 19	48 12 54	46 43 24
	Aldebaran	E.	83 18 55	81 50 35	80 22 9	78 53 36
	Sun	E.	131 26 5	130 3 29	128 40 45	127 17 54
20	*a* Aquilæ	W.	59 54 58	61 8 18	62 22 14	63 36 45

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
11	Regulus	W.	107 30 2	109 1 38	110 33 5	112 4 24
	Spica	W.	53 28 31	55 0 0	56 31 20	58 2 33
	a Aquilæ	E.	54 30 44	53 20 11	52 10 30	51 1 43
	Fomalhaut	E.	75 42 32	74 18 7	72 53 56	71 29 59
	a Pegasi	E.	97 20 44	95 53 2	94 25 26	92 57 58
12	Spica	W.	65 36 43	67 7 13	68 37 36	70 7 52
	Antares	W.	19 42 45	21 13 19	22 43 47	24 14 9
	a Aquilæ	E.	45 33 27	44 31 24	43 30 44	42 31 33
	Fomalhaut	E.	64 34 15	63 11 57	61 49 58	60 28 19
	a Pegasi	E.	85 42 22	84 15 37	82 48 59	81 22 29
13	Spica	W.	77 37 49	79 7 32	80 37 10	82 6 44
	Antares	W.	31 44 30	33 14 18	34 44 1	36 13 40
	Fomalhaut	E.	53 45 35	52 26 18	51 7 29	49 49 11
	a Pegasi	E.	74 11 56	72 46 14	71 20 41	69 55 16
	a Arietis	E.	116 16 35	114 47 11	113 17 51	111 48 36
14	Spica	W.	89 33 27	91 2 37	92 31 43	94 0 45
	Antares	W.	43 40 48	45 10 3	46 39 13	48 8 21
	Fomalhaut	E.	43 26 41	42 12 18	40 58 47	39 46 10
	a Pegasi	E.	62 50 36	61 26 10	60 1 56	58 37 54
	a Arietis	E.	104 23 15	102 54 21	101 25 31	99 56 43
15	Spica	W.	101 25 16	102 54 4	104 22 50	105 51 34
	Antares	W.	55 33 19	57 2 12	58 31 3	59 59 52
	Fomalhaut	E.	34 0 5	32 55 3	31 51 44	30 50 19
	a Pegasi	E.	51 41 0	50 18 22	48 56 2	47 34 1
	a Arietis	E.	92 33 24	91 4 50	89 36 18	88 7 48
16	Spica	W.	113 15 0	114 43 40	116 12 20	117 41 0
	Antares	W.	67 23 47	68 52 33	70 21 19	71 50 6
	a Pegasi	E.	40 49 30	39 29 58	38 10 59	36 52 38
	a Arietis	E.	80 45 31	79 17 5	77 48 39	76 20 12
	Aldebaran	E.	112 29 48	111 2 45	109 35 40	108 8 32
17	Antares	W.	79 14 17	80 43 13	82 12 12	83 41 14
	a Pegasi	E.	30 32 47	29 19 57	28 8 28	26 58 32
	a Arietis	E.	68 57 46	67 29 13	66 0 37	64 31 59
	Aldebaran	E.	100 52 16	99 24 51	97 57 24	96 29 53
18	Antares	W.	91 7 18	92 36 45	94 6 18	95 35 56
	a Aquilæ	W.	46 14 28	47 17 40	48 22 0	49 27 23
	a Arietis	E.	57 8 1	55 39 2	54 9 59	52 40 50
	Aldebaran	E.	89 11 16	87 43 19	86 15 16	84 47 8
19	Antares	W.	103 5 50	104 36 13	106 6 44	107 37 25
	a Aquilæ	W.	55 8 14	56 18 52	57 30 13	58 42 16
	Fomalhaut	W.	30 6 18	31 7 17	32 10 27	33 15 37
	a Arietis	E.	45 13 48	43 44 5	42 14 16	40 44 20
	Aldebaran	E.	77 24 57	75 56 10	74 27 16	72 58 14
	Sun	E.	125 54 54	124 31 46	123 8 28	121 45 1
20	*a* Aquilæ	W.	64 51 50	66 7 28	67 23 36	68 40 15

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
20	Fomalhaut	W.	34 22 37	35 31 18	36 41 33	37 53 13
	α Arietis	E.	39 14 17	37 44 7	36 13 50	34 43 26
	Aldebaran	E.	71 29 4	69 59 45	68 30 18	67 0 43
	Sun	E.	120 21 24	118 57 36	117 33 38	116 9 28
21	α Aquilæ	W.	69 57 22	71 14 58	72 33 2	73 51 32
	Fomalhaut	W.	44 9 46	45 28 10	46 47 28	48 7 37
	Aldebaran	E.	59 30 25	57 59 52	56 29 9	54 58 16
	Jupiter	E.	90 23 0	88 52 8	87 21 3	85 49 42
	Sun	E.	109 5 30	107 40 2	106 14 18	104 48 20
22	α Aquilæ	W.	80 30 18	81 51 14	83 12 32	84 34 11
	Fomalhaut	W.	54 59 44	56 24 13	57 49 21	59 15 5
	α Pegasi	W.	32 43 48	34 4 51	35 27 10	36 50 40
	Aldebaran	E.	47 21 24	45 49 34	44 17 36	42 45 30
	Jupiter	E.	78 8 51	76 35 49	75 2 28	73 28 48
	Sun	E.	97 34 20	96 6 39	94 38 40	93 10 21
23	α Aquilæ	W.	91 27 29	92 51 4	94 14 56	95 39 4
	Fomalhaut	W.	66 32 28	68 1 35	69 31 14	71 1 24
	α Pegasi	W.	44 3 20	45 32 30	47 2 27	48 33 9
	Aldebaran	E.	35 3 52	33 31 32	31 59 18	30 27 14
	Jupiter	E.	65 35 26	63 59 43	62 23 37	60 47 9
	Sun	E.	85 43 42	84 13 18	82 42 31	81 11 22
24	α Aquilæ	W.	102 43 17	104 8 43	105 34 17	106 59 58
	Fomalhaut	W.	78 39 41	80 12 47	81 46 21	83 20 21
	α Pegasi	W.	56 17 2	57 51 44	59 27 3	61 2 57
	α Arietis	W.	12 40 22	14 14 9	15 49 44	17 26 45
	Aldebaran	E.	22 53 30	21 25 19	19 58 39	18 33 59
	Jupiter	E.	52 39 1	51 0 12	49 20 59	47 41 21
	Sun	E.	73 29 40	71 56 7	70 22 8	68 47 44
25	α Aquilæ	W.	114 9 6	115 34 49	117 0 24	118 25 48
	Fomalhaut	W.	91 16 54	92 53 26	94 30 21	96 7 39
	α Pegasi	W.	69 11 0	70 50 14	72 30 0	74 10 15
	α Arietis	W.	25 46 46	27 29 5	29 12 1	30 55 33
	Jupiter	E.	39 17 4	37 35 0	35 52 31	34 9 39
	Sun	E.	60 49 16	59 12 16	57 34 50	55 56 58
26	Fomalhaut	W.	104 19 3	105 58 12	107 37 34	109 17 9
	α Pegasi	W.	82 38 48	84 21 53	86 5 23	87 49 17
	α Arietis	W.	39 41 31	41 28 14	43 15 25	45 3 4
	Jupiter	E.	25 29 52	23 44 57	21 59 47	20 14 25
	Sun	E.	47 41 9	46 0 43	44 19 52	42 38 37
27	α Pegasi	W.	96 34 27	98 20 29	100 6 48	101 53 23
	α Arietis	W.	54 7 48	55 57 56	57 48 27	59 39 19
	Aldebaran	W.	24 5 23	25 45 12	27 26 40	29 9 30
	Sun	E.	34 6 33	32 23 3	30 39 13	28 55 4
31	Sun	W.	22 38 3	24 23 38	26 8 59	27 54 5
	Spica	E.	51 33 50	49 41 8	47 48 42	45 56 32
	Antares	E.	97 23 48	95 30 55	93 38 17	91 45 54

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
20	Fomalhaut	W.	39 6 14	40 20 28	41 35 51	42 52 18
	α Arietis	E.	33 12 55	31 42 17	30 11 34	28 40 44
	Aldebaran	E.	65 30 58	64 1 4	62 31 1	61 0 48
	Sun	E.	114 45 6	113 20 32	111 55 45	110 30 44
21	α Aquilæ	W.	75 10 28	76 29 50	77 49 36	79 9 45
	Fomalhaut	W.	49 28 34	50 50 17	52 12 45	53 35 54
	Aldebaran	E.	53 27 13	51 56 1	50 24 38	48 53 6
	Jupiter	E.	84 18 5	82 46 12	81 14 3	79 41 36
	Sun	E.	103 22 6	101 55 35	100 28 47	99 1 43
22	α Aquilæ	W.	85 56 11	87 18 32	88 41 12	90 4 11
	Fomalhaut	W.	60 41 26	62 8 21	63 35 50	65 3 52
	α Pegasi	W.	38 15 16	39 40 54	41 7 29	42 34 59
	Aldebaran	E.	41 13 18	39 41 0	38 8 39	36 36 15
	Jupiter	E.	71 54 48	70 20 29	68 45 49	67 10 48
	Sun	E.	91 41 43	90 12 44	88 43 24	87 13 44
23	α Aquilæ	W.	97 3 28	98 28 6	99 52 58	101 18 2
	Fomalhaut	W.	72 32 5	74 3 15	75 34 55	77 7 4
	α Pegasi	W.	50 4 35	51 36 42	53 9 30	54 42 57
	Aldebaran	E.	28 55 27	27 24 1	25 53 6	24 22 51
	Jupiter	E.	59 10 18	57 33 4	55 55 27	54 17 26
	Sun	E.	79 39 49	78 7 53	76 35 33	75 2 49
24	α Aquilæ	W.	108 25 44	109 51 34	111 17 26	112 43 17
	Fomalhaut	W.	84 54 49	86 29 42	88 5 1	89 40 45
	α Pegasi	W.	62 39 27	64 16 30	65 54 8	67 32 18
	α Arietis	W.	19 4 57	20 44 10	22 24 16	24 5 9
	Aldebaran	E.	17 11 56	15 53 17	14 39 7	13 30 49
	Jupiter	E.	46 1 19	44 20 52	42 40 0	40 58 44
	Sun	E.	67 12 54	65 37 38	64 1 57	62 25 49
25	α Aquilæ	W.	119 50 57	121 15 47	122 40 15	124 4 15
	Fomalhaut	W.	97 45 17	99 23 16	101 1 34	102 40 10
	α Pegasi	W.	75 51 1	77 32 15	79 13 59	80 56 10
	α Arietis	W.	32 39 40	34 24 21	36 9 33	37 55 17
	Jupiter	E.	32 26 25	30 42 48	28 58 49	27 14 30
	Sun	E.	54 18 40	52 39 56	51 0 46	49 21 10
26	Fomalhaut	W.	110 56 54	112 36 48	114 16 49	115 56 56
	α Pegasi	W.	89 33 35	91 18 17	93 3 20	94 48 44
	α Arietis	W.	46 51 10	48 39 42	50 28 40	52 18 2
	Jupiter	E.	18 28 55	16 43 23	14 57 58	13 12 52
	Sun	E.	40 56 58	39 14 55	37 32 30	35 49 42
27	α Pegasi	W.	103 40 12	105 27 13	107 14 26	109 1 48
	α Arietis	W.	61 30 31	63 22 2	65 13 51	67 5 58
	Aldebaran	W.	30 53 33	32 38 39	34 24 40	36 11 31
	Sun	E.	27 10 36	25 25 51	23 40 50	21 55 34
31	Sun	W.	29 38 55	31 23 28	33 7 42	34 51 38
	Spica	E.	44 4 41	42 13 8	40 21 55	38 31 2
	Antares	E.	89 53 49	88 2 2	86 10 33	84 19 24

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
1	Sun	W.	36° 35′ 14″	38° 18′ 29″	40° 1′ 23″	41° 43′ 55″
	Spica	E.	36 40 32	34 50 24	33 0 39	31 11 19
	Antares	E.	82 28 35	80 38 7	78 48 0	76 58 16
2	Sun	W.	50 10 48	51 50 57	53 30 42	55 10 2
	Antares	E.	67 55 26	66 8 6	64 21 10	62 34 39
	α Aquilæ	E.	117 43 27	116 15 54	114 48 8	113 20 14
3	Sun	W.	63 20 18	64 57 4	66 33 24	68 9 19
	Antares	E.	53 48 32	52 4 36	50 21 5	48 38 1
	α Aquilæ	E.	106 0 10	104 32 19	103 4 37	101 37 3
4	Sun	W.	76 2 33	77 35 58	79 8 58	80 41 35
	Antares	E.	40 8 57	38 28 23	36 48 13	35 8 27
	α Aquilæ	E.	94 22 32	92 56 25	91 30 36	90 5 7
	Fomalhaut	E.	119 36 45	118 5 54	116 35 9	115 4 30
5	Sun	W.	88 18 52	89 49 13	91 19 12	92 48 51
	Spica	W.	19 8 0	20 44 38	22 21 3	23 57 12
	Antares	E.	26 55 24	25 17 55	23 40 46	22 3 59
	α Aquilæ	E.	83 2 59	81 39 43	80 16 51	78 54 24
	Fomalhaut	E.	107 33 26	106 3 45	104 34 17	103 5 1
6	Sun	W.	100 12 9	101 39 53	103 7 19	104 34 28
	Spica	W.	31 54 1	33 28 34	35 2 51	36 36 53
	α Aquilæ	E.	72 8 59	70 49 21	69 30 14	68 11 39
	Fomalhaut	E.	95 42 7	94 14 15	92 46 37	91 19 14
	α Pegasi	E.	117 59 19	116 29 28	114 59 45	113 30 12
7	Sun	W.	111 46 14	113 11 50	114 37 13	116 2 23
	Spica	W.	44 23 18	45 55 53	47 28 15	49 0 24
	α Aquilæ	E.	61 47 20	60 32 20	59 18 1	58 4 24
	Fomalhaut	E.	84 6 5	82 40 13	81 14 36	79 49 15
	α Pegasi	E.	106 4 46	104 36 10	103 7 43	101 39 27
8	Sun	W.	123 5 10	124 29 10	125 53 0	127 16 40
	Spica	W.	56 38 14	58 9 16	59 40 8	61 10 51
	α Aquilæ	E.	52 8 7	50 59 29	49 51 51	48 45 15
	Fomalhaut	E.	72 46 27	71 22 43	69 59 15	68 36 4
	α Pegasi	E.	94 20 24	92 53 3	91 25 51	89 58 48
9	Spica	W.	68 42 20	70 12 15	71 42 3	73 11 45
	Antares	W.	22 48 24	24 18 25	25 48 18	27 18 6
	Fomalhaut	E.	61 44 45	60 23 27	59 2 31	57 41 57
	α Pegasi	E.	82 45 44	81 19 32	79 53 29	78 27 33
	α Arietis	E.	125 10 43	123 41 10	122 11 42	120 42 20
10	Spica	W.	80 38 56	82 8 8	83 37 16	85 6 20
	Antares	W.	34 45 42	36 14 59	37 44 12	39 13 22
	Fomalhaut	E.	51 5 13	49 47 16	48 29 51	47 13 0
	α Pegasi	E.	71 19 59	69 54 54	68 29 56	67 5 7
	α Arietis	E.	113 16 42	111 47 46	110 18 55	108 50 6
11	Spica	W.	92 31 0	93 59 49	95 28 37	96 57 23
	Antares	W.	46 38 27	48 7 22	49 36 14	51 5 6

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Sun	W.	43 26 5	45 7 51	46 49 14	48 30 13
	Spica	E.	29 22 24	27 33 55	25 45 54	23 58 22
	Antares	E.	75 8 55	73 19 57	71 31 22	69 43 12
2	Sun	W.	56 48 56	58 27 25	60 5 28	61 43 6
	Antares	E.	60 48 34	59 2 55	57 17 41	55 32 54
	α Aquilæ	E.	111 52 14	110 24 12	108 56 8	107 28 7
3	Sun	W.	69 44 48	71 19 52	72 54 30	74 28 44
	Antares	E.	46 55 22	45 13 8	43 31 19	41 49 56
	α Aquilæ	E.	100 9 41	98 42 32	97 15 37	95 48 56
4	Sun	W.	82 13 48	83 45 38	85 17 5	86 48 10
	Antares	E.	33 29 5	31 50 5	30 11 29	28 33 16
	α Aquilæ	E.	88 39 58	87 15 10	85 50 44	84 26 40
	Fomalhaut	E.	113 33 58	112 3 35	110 33 21	109 3 18
5	Sun	W.	94 18 10	95 47 8	97 15 47	98 44 8
	Spica	W.	25 33 6	27 8 44	28 44 6	30 19 12
	Antares	E.	20 27 32	18 51 26	17 15 39	15 40 12
	α Aquilæ	E.	77 32 24	76 10 51	74 49 45	73 29 7
	Fomalhaut	E.	101 35 59	100 7 10	98 38 35	97 10 14
6	Sun	W.	106 1 20	107 27 57	108 54 17	110 20 23
	Spica	W.	38 10 39	39 44 10	41 17 27	42 50 30
	α Aquilæ	E.	66 53 37	65 36 8	64 19 15	63 2 59
	Fomalhaut	E.	89 52 6	88 25 13	86 58 35	85 32 13
	α Pegasi	E.	112 0 48	110 31 33	109 2 28	107 33 32
7	Sun	W.	117 27 20	118 52 5	120 16 37	121 40 59
	Spica	W.	50 32 21	52 4 6	53 35 39	55 7 2
	α Aquilæ	E.	56 51 31	55 39 25	54 28 7	53 17 40
	Fomalhaut	E.	78 24 9	76 59 20	75 34 46	74 10 29
	α Pegasi	E.	100 11 19	98 43 21	97 15 33	95 47 54
8	Sun	W.	128 40 12	130 3 35	131 26 49	132 49 55
	Spica	W.	62 41 25	64 11 50	65 42 8	67 12 17
	α Aquilæ	E.	47 39 45	46 35 25	45 32 19	44 30 31
	Fomalhaut	E.	67 13 12	65 50 37	64 28 20	63 6 23
	α Pegasi	E.	88 31 54	87 5 9	85 38 32	84 12 4
9	Spica	W.	74 41 21	76 10 53	77 40 18	79 9 39
	Antares	W.	28 47 47	30 17 24	31 46 54	33 16 20
	Fomalhaut	E.	56 21 45	55 1 58	53 42 36	52 23 40
	α Pegasi	E.	77 1 46	75 36 7	74 10 36	72 45 14
	α Arietis	E.	119 13 3	117 43 51	116 14 44	114 45 41
10	Spica	W.	86 35 22	88 4 20	89 33 16	91 2 9
	Antares	W.	40 42 28	42 11 32	43 40 33	45 9 31
	Fomalhaut	E.	45 56 45	44 41 10	43 26 17	42 12 10
	α Pegasi	E.	65 40 27	64 15 56	62 51 34	61 27 22
	α Arietis	E.	107 21 20	105 52 37	104 23 56	102 55 18
11	Spica	W.	98 26 8	99 54 52	101 23 35	102 52 18
	Antares	W.	52 33 56	54 2 45	55 31 34	57 0 23

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
11	Fomalhaut	E.	40 58 53	39 46 29	38 35 4	37 24 43
	a Pegasi	E.	60 3 20	58 39 28	57 15 47	55 52 18
	a Arietis	E.	101 26 41	99 58 6	98 29 33	97 1 0
12	Spica	W.	104 21 1	105 49 44	107 18 27	108 47 11
	Antares	W.	58 29 11	59 58 0	61 26 48	62 55 38
	Fomalhaut	E.	31 52 52	30 51 28	29 52 8	28 55 5
	a Pegasi	E.	48 58 11	47 36 8	46 14 24	44 53 0
	a Arietis	E.	89 38 29	88 9 59	86 41 29	85 12 59
	Aldebaran	E.	121 13 20	119 46 32	118 19 41	116 52 46
13	Antares	W.	70 20 0	71 48 57	73 17 56	74 46 57
	a Pegasi	E.	38 12 17	36 53 44	35 35 49	34 18 40
	a Arietis	E.	77 50 13	76 21 36	74 52 58	73 24 17
	Aldebaran	E.	109 37 16	108 9 59	106 42 39	105 15 15
14	Antares	W.	82 12 43	83 42 2	85 11 24	86 40 50
	a Aquilæ	W.	40 22 51	41 17 47	42 14 21	43 12 29
	a Arietis	E.	66 0 18	64 31 23	63 2 24	61 33 22
	Aldebaran	E.	97 57 17	96 29 30	95 1 39	93 33 43
15	Antares	W.	94 9 6	95 38 59	97 8 58	98 39 3
	a Aquilæ	W.	48 23 8	49 28 43	50 35 17	51 42 48
	a Arietis	E.	54 7 20	52 37 56	51 8 29	49 38 56
	Aldebaran	E.	86 13 0	84 44 38	83 16 10	81 47 38
	Jupiter	E.	122 50 34	121 22 22	119 54 4	118 25 40
16	Antares	W.	106 10 57	107 41 40	109 12 31	110 43 29
	a Aquilæ	W.	57 32 34	58 44 39	59 57 22	61 10 41
	Fomalhaut	W.	32 14 27	33 19 42	34 26 46	35 35 28
	a Arietis	E.	42 10 9	40 40 11	39 10 7	37 39 59
	Aldebaran	E.	74 23 40	72 54 36	71 25 27	69 56 11
	Jupiter	E.	111 2 3	109 32 59	108 3 46	106 34 27
	Pollux	E.	116 50 1	115 19 35	113 49 1	112 18 20
17	*a* Aquilæ	W.	67 25 16	68 41 37	69 58 23	71 15 34
	Fomalhaut	W.	41 39 22	42 55 32	44 12 37	45 30 36
	a Arietis	E.	30 8 21	28 37 53	27 7 23	25 36 54
	Aldebaran	E.	62 28 27	60 58 37	59 28 40	57 58 37
	Jupiter	E.	99 5 39	97 35 26	96 5 3	94 34 30
	Pollux	E.	104 42 40	103 11 5	101 39 20	100 7 24
	Sun	E.	137 53 39	136 29 0	135 4 11	133 39 12
18	*a* Aquilæ	W.	77 47 7	79 6 27	80 26 6	81 46 3
	Fomalhaut	W.	52 11 56	53 34 12	54 57 4	56 20 30
	a Pegasi	W.	30 3 27	31 20 46	32 39 30	33 59 32
	Aldebaran	E.	50 26 59	48 56 24	47 25 45	45 55 2
	Jupiter	E.	86 59 0	85 27 19	83 55 25	82 23 18
	Pollux	E.	92 25 1	90 51 58	89 18 42	87 45 12
	Sun	E.	126 31 33	125 5 26	123 39 7	122 12 35
19	*a* Aquilæ	W.	88 29 55	89 51 27	91 13 12	92 35 10
	Fomalhaut	W.	63 25 28	64 51 55	66 18 48	67 46 8
	a Pegasi	W.	40 55 42	42 21 36	43 48 16	45 15 38

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
11	Fomalhaut	E.	36 15 32	35 7 37	34 1 6	32 56 8
	a Pegasi	E.	54 29 1	53 5 57	51 43 7	50 20 31
	a Arietis	E.	95 32 29	94 3 58	92 35 29	91 6 59
12	Spica	W.	110 15 55	111 44 40	113 13 26	114 42 13
	Antares	W.	64 24 28	65 53 19	67 22 11	68 51 5
	Fomalhaut	E.	28 0 32	27 8 44	26 19 58	25 34 32
	a Pegasi	E.	43 31 58	42 11 20	40 51 9	39 31 27
	a Arietis	E.	83 44 28	82 15 56	80 47 23	79 18 49
	Aldebaran	E.	115 25 47	113 58 45	112 31 39	111 4 29
13	Antares	W.	76 16 0	77 45 7	79 14 16	80 43 28
	a Pegasi	E.	33 2 21	31 46 58	30 32 39	29 19 32
	a Arietis	E.	71 55 34	70 26 49	68 58 1	67 29 11
	Aldebaran	E.	103 47 47	102 20 15	100 52 40	99 25 1
14	Antares	W.	88 10 20	89 39 55	91 9 34	92 39 17
	a Aquilæ	W.	44 12 3	45 12 59	46 15 12	47 18 36
	a Arietis	E.	60 4 17	58 35 8	57 5 56	55 36 40
	Aldebaran	E.	92 5 44	90 37 39	89 9 31	87 41 18
15	Antares	W.	100 9 13	101 39 29	103 9 52	104 40 21
	a Aquilæ	W.	52 51 11	54 0 24	55 10 24	56 21 8
	a Arietis	E.	48 9 20	46 39 39	45 9 54	43 40 4
	Aldebaran	E.	80 19 1	78 50 19	77 21 31	75 52 38
	Jupiter	E.	116 57 10	115 28 33	113 59 50	112 31 0
16	Antares	W.	112 14 36	113 45 51	115 17 14	116 48 45
	a Aquilæ	W.	62 24 35	63 39 0	64 53 56	66 9 22
	Fomalhaut	W.	36 45 41	37 57 18	39 10 10	40 24 13
	a Arietis	E.	36 9 47	34 39 31	33 9 11	31 38 48
	Aldebaran	E.	68 26 50	66 57 24	65 27 51	63 58 12
	Jupiter	E.	105 4 59	103 35 22	102 5 37	100 35 43
	Pollux	E.	110 47 29	109 16 31	107 45 23	106 14 6
17	*a* Aquilæ	W.	72 33 9	73 51 6	75 9 26	76 28 6
	Fomalhaut	W.	46 49 24	48 8 58	49 29 17	50 50 17
	a Arietis	E.	24 6 26	22 36 2	21 5 44	19 35 37
	Aldebaran	E.	56 28 29	54 58 15	53 27 55	51 57 30
	Jupiter	E.	93 3 46	91 32 52	90 1 46	88 30 29
	Pollux	E.	98 35 18	97 3 1	95 30 32	93 57 53
	Sun	E.	132 14 2	130 48 42	129 23 10	127 57 27
18	*a* Aquilæ	W.	83 6 17	84 26 48	85 47 35	87 8 38
	Fomalhaut	W.	57 44 28	59 8 59	60 33 59	61 59 30
	a Pegasi	W.	35 20 46	36 43 5	38 6 23	39 30 37
	Aldebaran	E.	44 24 15	42 53 26	41 22 35	39 51 44
	Jupiter	E.	80 50 58	79 18 24	77 45 37	76 12 35
	Pollux	E.	86 11 30	84 37 34	83 3 25	81 29 0
	Sun	E.	120 45 50	119 18 51	117 51 38	116 24 10
19	*a* Aquilæ	W.	93 57 19	95 19 41	96 42 12	98 4 54
	Fomalhaut	W.	69 13 54	70 42 5	72 10 41	73 39 40
	a Pegasi	W.	46 43 41	48 12 23	49 41 42	51 11 36

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
19	Aldebaran	E.	38 20 54	36 50 7	35 19 25	33 48 50
	Jupiter	E.	74 39 18	73 5 46	71 31 58	69 57 54
	Pollux	E.	79 54 22	78 19 28	76 44 19	75 8 54
	Sun	E.	114 56 28	113 28 31	112 0 18	110 31 49
20	α Aquilæ	W.	99 27 45	100 50 44	102 13 50	103 37 2
	Fomalhaut	W.	75 9 4	76 38 52	78 9 2	79 39 35
	α Pegasi	W.	52 42 5	54 13 8	55 44 43	57 16 49
	Aldebaran	E.	26 19 57	24 51 40	23 24 14	21 57 54
	Jupiter	E.	62 3 25	60 27 39	58 51 33	57 15 9
	Pollux	E.	67 7 40	65 30 33	63 53 8	62 15 25
	Sun	E.	103 5 12	101 34 59	100 4 28	98 33 37
21	α Aquilæ	W.	110 33 52	111 57 13	113 20 31	114 43 42
	Fomalhaut	W.	87 17 51	88 50 34	90 23 37	91 57 0
	α Pegasi	W.	65 4 50	66 39 52	68 15 22	69 51 19
	α Arietis	W.	21 33 45	23 11 19	24 49 34	26 28 25
	Jupiter	E.	49 8 19	47 29 56	45 51 13	44 12 9
	Pollux	E.	54 2 0	52 22 19	50 42 19	49 1 58
	Sun	E.	90 54 27	89 21 36	87 48 23	86 14 48
22	Fomalhaut	W.	99 48 37	101 23 48	102 59 16	104 34 58
	α Pegasi	W.	77 57 42	79 36 16	81 15 15	82 54 38
	α Arietis	W.	34 50 46	36 32 43	38 15 8	39 58 0
	Jupiter	E.	35 51 32	34 10 21	32 28 50	30 46 58
	Pollux	E.	40 35 7	38 52 44	37 10 1	35 26 58
	Sun	E.	78 21 22	76 45 33	75 9 20	73 32 45
23	Fomalhaut	W.	112 36 38	114 13 27	115 50 22	117 27 20
	α Pegasi	W.	91 17 31	92 59 13	94 41 16	96 23 41
	α Arietis	W.	48 38 59	50 24 28	52 10 22	53 56 40
	Aldebaran	W.	19 18 48	20 48 38	22 21 5	23 55 45
	Jupiter	E.	22 12 50	20 29 11	18 45 20	17 1 21
	Pollux	E.	26 47 13	25 2 31	23 17 37	21 32 36
	Sun	E.	65 24 0	63 45 5	62 5 47	60 26 7
24	α Pegasi	W.	105 0 25	106 44 36	108 29 2	110 13 40
	α Arietis	W.	62 54 8	64 42 46	66 31 45	68 21 6
	Aldebaran	W.	32 12 30	33 55 20	35 39 2	37 23 32
	Sun	E.	52 2 9	50 20 17	48 38 4	46 55 32
25	α Pegasi	W.	118 59 14	120 44 37	122 30 0	124 15 21
	α Arietis	W.	77 32 39	79 23 52	81 15 20	83 7 3
	Aldebaran	W.	46 15 54	48 4 0	49 52 33	51 41 31
	Sun	E.	38 18 7	36 33 46	34 49 11	33 4 21
30	Sun	W.	31 51 6	33 32 6	35 12 42	36 52 54
	Antares	E.	59 26 50	57 38 31	55 50 36	54 3 5
	α Aquilæ	E.	110 43 54	109 13 19	107 42 43	106 12 9
31	Sun	W.	45 7 38	46 45 17	48 22 29	49 59 16
	Antares	E.	45 11 54	43 26 57	41 42 28	39 58 24
	α Aquilæ	E.	98 41 5	97 11 29	95 42 8	94 13 4

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
19	Aldebaran	E.	32 18 25	30 48 14	29 18 22	27 48 54
	Jupiter	E.	68 23 35	66 48 58	65 14 5	63 38 54
	Pollux	E.	73 33 13	71 57 15	70 21 1	68 44 29
	Sun	E.	109 3 4	107 34 2	106 4 43	104 35 6
20	*α* Aquilæ	W.	105 0 19	106 23 40	107 47 3	109 10 28
	Fomalhaut	W.	81 10 31	82 41 49	84 13 29	85 45 29
	α Pegasi	W.	58 49 26	60 22 33	61 56 10	63 30 16
	Aldebaran	E.	20 32 56	19 9 44	17 48 47	16 30 46
	Jupiter	E.	55 38 27	54 1 24	52 24 2	50 46 21
	Pollux	E.	60 37 22	58 59 1	57 20 20	55 41 20
	Sun	E.	97 2 27	95 30 58	93 59 8	92 26 58
21	*α* Aquilæ	W.	116 6 45	117 29 38	118 52 17	120 14 39
	Fomalhaut	W.	93 30 43	95 4 44	96 39 4	98 13 42
	α Pegasi	W.	71 27 43	73 4 34	74 41 51	76 19 34
	α Arietis	W.	28 7 50	29 47 49	31 28 18	33 9 17
	Jupiter	E.	42 32 44	40 52 58	39 12 50	37 32 22
	Pollux	E.	47 21 17	45 40 15	43 58 53	42 17 10
	Sun	E.	84 40 51	83 6 33	81 31 52	79 56 48
22	Fomalhaut	W.	106 10 54	107 47 4	109 23 25	110 59 57
	α Pegasi	W.	84 34 26	86 14 37	87 55 12	89 36 11
	α Arietis	W.	41 41 19	43 25 5	45 9 17	46 53 55
	Jupiter	E.	29 4 46	27 22 14	25 39 23	23 56 15
	Pollux	E.	33 43 36	31 59 55	30 15 57	28 31 43
	Sun	E.	71 55 47	70 18 25	68 40 40	67 2 31
23	Fomalhaut	W.	119 4 21	120 41 21	122 18 19	123 55 10
	α Pegasi	W.	98 6 25	99 49 28	101 32 50	103 16 29
	α Arietis	W.	55 43 23	57 30 30	59 18 0	61 5 53
	Aldebaran	W.	25 32 16	27 10 24	28 49 55	30 30 40
	Jupiter	E.	15 17 19	13 33 22	11 49 44	10 6 45
	Pollux	E.	19 47 32	18 2 31	16 17 42	14 33 17
	Sun	E.	58 46 4	57 5 38	55 24 50	53 43 40
24	*α* Pegasi	W.	111 58 30	113 43 30	115 28 38	117 13 54
	α Arietis	W.	70 10 46	72 0 47	73 51 6	75 41 44
	Aldebaran	W.	39 8 46	40 54 40	42 41 12	44 28 17
	Sun	E.	45 12 39	43 29 28	41 45 58	40 2 11
25	*α* Pegasi	W.	126 0 38	127 45 46	129 30 43	131 15 25
	α Arietis	W.	84 59 0	86 51 10	88 43 32	90 36 6
	Aldebaran	W.	53 30 52	55 20 35	57 10 36	59 0 55
	Sun	E.	31 19 17	29 34 2	27 48 35	26 2 57
30	Sun	W.	38 32 42	40 12 4	41 51 1	43 29 32
	Antares	E.	52 16 0	50 29 20	48 43 5	46 57 16
	α Aquilæ	E.	104 41 39	103 11 16	101 41 1	100 10 57
31	Sun	W.	51 35 36	53 11 29	54 46 56	56 21 57
	Antares	E.	38 14 47	36 31 37	34 48 54	33 6 37
	α Aquilæ	E.	92 44 20	91 15 56	89 47 53	88 20 14

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
1	Sun	W.	57° 56′ 31″	59° 30′ 39″	61° 4′ 20″	62° 37′ 37″
	Spica	W.	14 41 42	16 21 40	18 1 27	19 41 0
	Antares	E.	31 24 46	29 43 22	28 2 24	26 21 52
	a Aquilæ	E.	86 52 58	85 26 7	83 59 43	82 33 46
	Fomalhaut	E.	111 41 4	110 8 14	108 35 37	107 3 15
2	Sun	W.	70 17 38	71 48 24	73 18 47	74 48 46
	Spica	W.	27 54 13	29 31 51	31 9 7	32 46 2
	a Aquilæ	E.	75 31 19	74 8 24	72 46 3	71 24 16
	Fomalhaut	E.	99 25 28	97 54 47	96 24 24	94 54 21
3	Sun	W.	82 13 9	83 40 58	85 8 27	86 35 36
	Spica	W.	40 45 28	42 20 21	43 54 55	45 29 11
	a Aquilæ	E.	64 44 36	63 26 39	62 9 24	60 52 53
	Fomalhaut	E.	87 28 55	86 0 50	84 33 4	83 5 39
	a Pegasi	E.	109 32 35	108 1 55	106 31 29	105 1 18
4	Sun	W.	93 46 48	95 12 11	96 37 18	98 2 10
	Spica	W.	53 16 1	54 48 34	56 20 51	57 52 53
	a Aquilæ	E.	54 42 13	53 30 42	52 20 8	51 10 35
	Fomalhaut	E.	75 53 37	74 28 14	73 3 12	71 38 31
	a Pegasi	E.	97 33 57	96 5 11	94 36 39	93 8 20
5	Sun	W.	105 3 2	106 26 35	107 49 56	109 13 6
	Spica	W.	65 29 42	67 0 27	68 31 1	70 1 24
	Antares	W.	19 35 41	21 6 31	22 37 10	24 7 39
	Fomalhaut	E.	64 40 26	63 17 55	61 55 47	60 34 3
	a Pegasi	E.	85 50 2	84 22 59	82 56 9	81 29 30
6	Sun	W.	116 6 35	117 28 51	118 51 1	120 13 4
	Spica	W.	77 31 2	79 0 33	80 29 58	81 59 16
	Antares	W.	31 37 43	33 7 19	34 36 49	36 6 12
	Fomalhaut	E.	53 51 39	52 32 32	51 13 56	49 55 51
	a Pegasi	E.	74 19 4	72 53 31	71 28 9	70 2 57
	a Arietis	E.	116 24 0	114 54 47	113 25 40	111 56 39
7	Sun	W.	127 1 56	128 23 29	129 44 59	131 6 26
	Spica	W.	89 24 29	90 53 19	92 22 6	93 50 50
	Antares	W.	43 31 50	45 0 45	46 29 37	47 58 27
	Fomalhaut	E.	43 34 32	42 20 23	41 7 4	39 54 38
	a Pegasi	E.	62 59 32	61 35 22	60 11 24	58 47 36
	a Arietis	E.	104 32 46	103 4 11	101 35 38	100 7 8
8	Spica	W.	101 14 8	102 42 45	104 11 23	105 40 1
	Antares	W.	55 22 11	56 50 54	58 19 37	59 48 20
	a Pegasi	E.	51 51 38	50 29 7	49 6 51	47 44 52
	a Arietis	E.	92 45 1	91 16 37	89 48 13	88 19 49
	Aldebaran	E.	124 16 26	122 49 51	121 23 12	119 56 29
9	Spica	W.	113 3 32	114 32 20	116 1 12	117 30 6
	Antares	W.	67 12 20	68 41 15	70 10 13	71 19 14
	a Pegasi	E.	40 59 56	39 40 11	38 20 56	37 2 16
	a Arietis	E.	80 57 25	79 28 50	78 0 13	76 31 32
	Aldebaran	E.	112 41 43	111 14 32	109 47 16	108 19 54

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Sun	W.	64 10 27	65 42 52	67 14 52	68 46 27
	Spica	W.	21 20 17	22 59 16	24 37 56	26 16 15
	Antares	E.	24 41 46	23 2 5	21 22 49	19 43 58
	α Aquilæ	E.	81 8 17	79 43 16	78 18 46	76 54 47
	Fomalhaut	E.	105 31 8	103 59 18	102 27 44	100 56 27
2	Sun	W.	76 18 23	77 47 37	79 16 29	80 44 59
	Spica	W.	34 22 37	35 58 50	37 34 43	39 10 16
	α Aquilæ	E.	70 3 5	68 42 30	67 22 33	66 3 14
	Fomalhaut	E.	93 24 37	91 55 12	90 26 6	88 57 21
3	Sun	W.	88 2 26	89 28 58	90 55 12	92 21 8
	Spica	W.	47 3 7	48 36 46	50 10 8	51 43 13
	α Aquilæ	E.	59 37 7	58 22 9	57 7 59	55 54 40
	Fomalhaut	E.	81 38 33	80 11 49	78 45 24	77 19 20
	α Pegasi	E.	103 31 21	102 1 39	100 32 11	99 2 57
4	Sun	W.	99 26 48	100 51 11	102 15 21	103 39 18
	Spica	W.	59 24 42	60 56 16	62 27 37	63 58 46
	α Aquilæ	E.	50 2 4	48 54 39	47 48 24	46 43 23
	Fomalhaut	E.	70 14 11	68 50 12	67 26 35	66 3 19
	α Pegasi	E.	91 40 15	90 12 22	88 44 43	87 17 16
5	Sun	W.	110 36 6	111 58 57	113 21 38	114 44 10
	Spica	W.	71 31 38	73 1 42	74 31 37	76 1 23
	Antares	W.	25 37 58	27 8 7	28 38 7	30 7 59
	Fomalhaut	E.	59 12 43	57 51 47	56 31 18	55 11 15
	α Pegasi	E.	80 3 2	78 36 46	77 10 41	75 44 47
6	Sun	W.	121 35 1	122 56 52	124 18 38	125 40 19
	Spica	W.	83 28 28	84 57 35	86 26 37	87 55 35
	Antares	W.	37 35 29	39 4 41	40 33 49	42 2 51
	Fomalhaut	E.	48 38 20	47 21 24	46 5 5	44 49 27
	α Pegasi	E.	68 37 55	67 13 4	65 48 23	64 23 52
	α Arietis	E.	110 27 43	108 58 52	107 30 6	106 1 24
7	Sun	W.	132 27 50	133 49 12	135 10 32	136 31 51
	Spica	W.	95 19 32	96 48 13	98 16 52	99 45 30
	Antares	W.	49 27 14	50 56 0	52 24 45	53 53 28
	Fomalhaut	E.	38 43 11	37 32 47	36 23 33	35 15 34
	α Pegasi	E.	57 24 0	56 0 35	54 37 23	53 14 24
	α Arietis	E.	98 38 40	97 10 14	95 41 49	94 13 25
8	Spica	W.	107 8 40	108 37 20	110 6 2	111 34 46
	Antares	W.	61 17 5	62 45 51	64 14 39	65 43 28
	α Pegasi	E.	46 23 10	45 1 48	43 40 47	42 20 9
	α Arietis	E.	86 51 23	85 22 56	83 54 28	82 25 58
	Aldebaran	E.	118 29 41	117 2 48	115 35 51	114 8 50
9	Spica	W.	118 59 3	120 28 5	121 57 10	123 26 19
	Antares	W.	73 8 18	74 37 26	76 6 39	77 35 55
	α Pegasi	E.	35 44 15	34 26 57	33 10 27	31 54 51
	α Arietis	E.	75 2 48	73 34 1	72 5 10	70 36 15
	Aldebaran	E.	106 52 28	105 24 56	103 57 19	102 29 36

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
10	Antares	W.	79° 5′ 16″	80° 34′ 42″	82° 4′ 13″	83° 33′ 50″
	α Arietis	E.	69 7 16	67 38 12	66 9 4	64 39 51
	Aldebaran	E.	101 1 48	99 33 54	98 5 55	96 37 49
11	Antares	W.	91 3 18	92 33 31	94 3 50	95 34 16
	α Aquilæ	W.	46 11 22	47 15 6	48 19 59	49 25 58
	α Arietis	E.	57 12 32	55 42 48	54 12 58	52 43 3
	Aldebaran	E.	89 15 50	87 47 8	86 18 19	84 49 23
12	Antares	W.	103 8 13	104 39 23	106 10 41	107 42 7
	α Aquilæ	W.	55 10 6	56 21 25	57 33 27	58 46 9
	Fomalhaut	W.	30 7 38	31 9 9	32 12 52	33 18 36
	α Arietis	E.	45 12 2	43 41 33	42 10 58	40 40 18
	Aldebaran	E.	77 23 10	75 53 35	74 23 54	72 54 7
	Jupiter	E.	119 0 0	117 30 10	116 0 11	114 30 5
	Pollux	E.	119 52 35	118 21 44	116 50 44	115 19 36
13	α Aquilæ	W.	64 58 45	66 14 52	67 31 27	68 48 28
	Fomalhaut	W.	39 11 53	40 26 34	41 42 21	42 59 8
	α Arietis	E.	33 5 48	31 34 42	30 3 35	28 32 26
	Aldebaran	E.	65 23 37	63 53 12	62 22 42	60 52 6
	Jupiter	E.	106 57 23	105 26 24	103 55 16	102 23 59
	Pollux	E.	107 41 44	106 9 43	104 37 33	103 5 14
14	α Aquilæ	W.	75 19 34	76 38 50	77 58 25	79 18 18
	Fomalhaut	W.	49 36 1	50 57 35	52 19 47	53 42 35
	α Pegasi	W.	27 43 32	28 58 9	30 14 31	31 32 25
	Aldebaran	E.	53 17 52	51 46 48	50 15 41	48 44 31
	Jupiter	E.	94 45 9	93 12 54	91 40 29	90 7 54
	Pollux	E.	95 21 15	93 47 59	92 14 32	90 40 55
15	α Aquilæ	W.	86 1 36	87 22 56	88 44 27	90 6 10
	Fomalhaut	W.	60 44 26	62 10 12	63 36 24	65 2 59
	α Pegasi	W.	38 20 28	39 45 1	41 10 23	42 36 29
	Aldebaran	E.	41 8 27	39 37 18	38 6 13	36 35 16
	Jupiter	E.	82 22 19	80 48 39	79 14 49	77 40 46
	Pollux	E.	82 50 15	81 15 35	79 40 44	78 5 42
	Saturn	E.	112 24 23	110 50 20	109 16 7	107 41 41
16	α Aquilæ	W.	96 56 52	98 19 20	99 41 53	101 4 29
	Fomalhaut	W.	72 21 27	73 50 10	75 19 12	76 48 32
	α Pegasi	W.	49 56 31	51 26 10	52 56 19	54 26 55
	Jupiter	E.	69 47 38	68 12 24	66 36 57	65 1 17
	Pollux	E.	70 7 39	68 31 26	66 55 2	65 18 26
	Saturn	E.	99 46 38	98 11 1	96 35 11	94 59 8
	Sun	E.	132 7 8	130 38 7	129 8 53	127 39 26
17	Fomalhaut	W.	84 19 27	85 50 26	87 21 40	88 53 9
	α Pegasi	W.	62 6 20	63 39 24	65 12 50	66 46 37
	α Arietis	W.	18 30 47	20 5 41	21 41 18	23 17 33
	Jupiter	E.	56 59 41	55 22 41	53 45 26	52 7 58
	Pollux	E.	57 12 12	55 34 17	53 56 10	52 17 50
	Saturn	E.	86 55 33	85 18 9	83 40 30	82 2 37
	Sun	E.	120 8 48	118 37 59	117 6 55	115 35 37

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
10	Antares	W.	85 3 32	86 33 20	88 3 13	89 33 13
	a Arietis	E.	63 10 34	61 41 11	60 11 43	58 42 10
	Aldebaran	E.	95 9 37	93 41 20	92 12 56	90 44 26
11	Antares	W.	97 4 49	98 35 29	100 6 16	101 37 10
	a Aquilæ	W.	50 32 59	51 40 57	52 49 50	53 59 34
	a Arietis	E.	51 13 2	49 42 55	48 12 43	46 42 25
	Aldebaran	E.	83 20 22	81 51 13	80 21 59	78 52 37
12	Antares	W.	109 13 41	110 45 23	112 17 14	113 49 13
	a Aquilæ	W.	59 59 31	61 13 29	62 28 2	63 43 8
	Fomalhaut	W.	34 26 10	35 35 25	36 46 12	37 58 24
	a Arietis	E.	39 9 33	37 38 43	36 7 49	34 36 50
	Aldebaran	E.	71 24 14	69 54 14	68 24 7	66 53 55
	Jupiter	E.	112 59 50	111 29 26	109 58 54	108 28 13
	Pollux	E.	113 48 19	112 16 53	110 45 19	109 13 36
13	*a* Aquilæ	W.	70 5 55	71 23 46	72 42 1	74 0 37
	Fomalhaut	W.	44 16 53	45 35 29	46 54 55	48 15 7
	a Arietis	E.	27 1 17	25 30 9	23 59 5	22 28 6
	Aldebaran	E.	59 21 25	57 50 39	56 19 47	54 48 52
	Jupiter	E.	100 52 32	99 20 56	97 49 10	96 17 15
	Pollux	E.	101 32 45	100 0 7	98 27 19	96 54 21
14	*a* Aquilæ	W.	80 38 28	81 58 53	83 19 34	84 40 28
	Fomalhaut	W.	55 5 57	56 29 50	57 54 14	59 19 6
	a Pegasi	W.	32 51 44	34 12 19	35 34 1	36 56 46
	Aldebaran	E.	47 13 19	45 42 6	44 10 52	42 39 38
	Jupiter	E.	88 35 8	87 2 12	85 29 5	83 55 47
	Pollux	E.	89 7 8	87 33 11	85 59 3	84 24 44
15	*a* Aquilæ	W.	91 28 2	92 50 4	94 12 13	95 34 29
	Fomalhaut	W.	66 29 58	67 57 19	69 25 1	70 53 4
	a Pegasi	W.	44 3 17	45 30 43	46 58 45	48 27 22
	Aldebaran	E.	35 4 27	33 33 49	32 3 26	30 33 22
	Jupiter	E.	76 6 32	74 32 7	72 57 29	71 22 40
	Pollux	E.	76 30 29	74 55 4	73 19 27	71 43 39
	Saturn	E.	106 7 5	104 32 16	102 57 15	101 22 3
16	*a* Aquilæ	W.	102 27 7	103 49 46	105 12 26	106 35 4
	Fomalhaut	W.	78 18 9	79 48 4	81 18 16	82 48 43
	a Pegasi	W.	55 57 58	57 29 27	59 1 21	60 33 39
	Jupiter	E.	63 25 25	61 49 19	60 13 0	58 36 27
	Pollux	E.	63 41 36	62 4 35	60 27 20	58 49 52
	Saturn	E.	93 22 52	91 46 23	90 9 40	88 32 44
	Sun	E.	126 9 46	124 39 52	123 9 45	121 39 24
17	Fomalhaut	W.	90 24 52	91 56 48	93 28 58	95 1 20
	a Pegasi	W.	68 20 46	69 55 15	71 30 5	73 5 14
	a Arietis	W.	24 54 20	26 31 38	28 9 23	29 47 34
	Jupiter	E.	50 30 15	48 52 17	47 14 5	45 35 38
	Pollux	E.	50 39 16	49 0 28	47 21 26	45 42 11
	Saturn	E.	80 24 29	78 46 6	77 7 28	75 28 35
	Sun	E.	114 4 4	112 32 16	111 0 13	109 27 55

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
18	Fomalhaut	W.	96 33 54	98 6 40	99 39 37	101 12 44
	a Pegasi	W.	74 40 43	76 16 31	77 52 38	79 29 4
	a Arietis	W.	31 26 9	33 5 8	34 44 29	36 24 11
	Jupiter	E.	43 56 55	42 17 58	40 38 45	38 59 17
	Pollux	E.	44 2 43	42 23 0	40 43 4	39 2 55
	Saturn	E.	73 49 26	72 10 1	70 30 21	68 50 24
	Sun	E.	107 55 21	106 22 31	104 49 25	103 16 4
19	Fomalhaut	W.	109 0 33	110 34 27	112 8 26	113 42 29
	a Pegasi	W.	87 35 43	89 13 55	90 52 23	92 31 8
	a Arietis	W.	44 47 53	46 29 38	48 11 41	49 54 4
	Aldebaran	W.	16 8 13	17 28 8	18 51 49	20 18 34
	Jupiter	E.	30 38 7	28 57 8	27 15 53	25 34 25
	Pollux	E.	30 38 57	28 57 35	27 16 4	25 34 24
	Saturn	E.	60 26 34	58 44 57	57 3 4	55 20 53
	Sun	E.	95 25 10	93 50 9	92 14 51	90 39 16
20	*a* Pegasi	W.	100 48 43	102 28 57	104 9 24	105 50 4
	a Arietis	W.	58 30 46	60 15 2	61 59 38	63 44 31
	Aldebaran	W.	28 3 6	29 40 16	31 18 27	32 57 33
	Satnrn	E.	46 45 37	45 1 42	43 17 29	41 32 58
	Sun	E.	82 37 1	80 59 42	79 22 6	77 44 13
21	*a* Arietis	W.	72 33 28	74 20 8	76 7 5	77 54 18
	Aldebaran	W.	41 24 9	43 7 18	44 50 58	46 35 8
	Saturn	E.	32 46 11	31 0 0	29 13 32	27 26 49
	Mars	E.	49 14 35	47 32 28	45 50 5	44 7 27
	Sun	E.	69 30 32	67 50 57	66 11 7	64 31 2
22	*a* Arietis	W.	86 54 22	88 43 7	90 32 5	92 21 17
	Aldebaran	W.	55 22 16	57 8 48	58 55 40	60 42 51
	Mars	E.	35 30 42	33 46 43	32 2 32	30 18 12
	Sun	E.	56 6 48	54 25 15	52 43 30	51 1 33
23	*a* Arietis	W.	101 30 8	103 20 24	105 10 49	107 1 21
	Aldebaran	W.	69 42 43	71 31 22	73 20 13	75 9 13
	Pollux	W.	26 52 23	28 41 43	30 31 21	32 21 14
	Jupiter	W.	25 56 33	27 45 43	29 35 5	31 24 38
	Sun	E.	42 29 7	40 46 12	39 3 10	37 20 3
28	Sun	W.	26 10 46	27 47 30	29 23 56	31 0 3
	Antares	E.	37 6 3	35 21 3	33 36 25	31 52 11
	a Aquilæ	E.	91 42 37	90 12 31	88 42 45	87 13 21
	Fomalhaut	E.	116 54 26	115 19 7	113 43 53	112 8 47
29	Sun	W.	38 55 28	40 29 26	42 3 2	43 36 14
	a Aquilæ	E.	79 52 27	78 25 40	76 59 25	75 33 41
	Fomalhaut	E.	104 16 3	102 42 12	101 8 38	99 35 22
30	Sun	W.	51 16 28	52 47 21	54 17 51	55 47 59
	a Aquilæ	E.	68 33 53	67 11 50	65 50 29	64 29 51
	Fomalhaut	E.	91 53 48	90 22 32	88 51 36	87 21 3
	a Pegasi	E.	113 58 55	112 25 13	110 51 48	109 18 39

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
18	Fomalhaut	W.	102 46 1	104 19 28	105 53 2	107 26 44
	a Pegasi	W.	81 5 48	82 42 51	84 20 11	85 57 48
	a Arietis	W.	38 4 15	39 44 39	41 25 24	43 6 29
	Jupiter	E.	37 19 34	35 39 35	33 59 21	32 18 52
	Pollux	E.	37 22 32	35 41 57	34 1 9	32 20 9
	Saturn	E.	67 10 11	65 29 42	63 48 56	62 7 53
	Sun	E.	101 42 26	100 8 32	98 34 21	96 59 54
19	Fomalhaut	W.	115 16 33	116 50 38	118 24 41	119 58 42
	a Pegasi	W.	94 10 9	95 49 25	97 28 57	99 8 43
	a Arietis	W.	51 36 47	53 19 48	55 3 9	56 46 48
	Aldebaran	W.	21 47 51	23 19 14	24 52 24	26 27 5
	Jupiter	E.	23 52 42	22 10 48	20 28 41	18 46 23
	Pollux	E.	23 52 39	22 10 51	20 29 2	18 47 18
	Saturn	E.	53 38 24	51 55 38	50 12 35	48 29 15
	Sun	E.	89 3 23	87 27 14	85 50 47	84 14 3
20	*a* Pegasi	W.	107 30 55	109 11 58	110 53 10	112 34 32
	a Arietis	W.	65 29 43	67 15 13	69 1 0	70 47 6
	Aldebaran	W.	34 37 29	36 18 10	37 59 33	39 41 33
	Saturn	E.	39 48 11	38 3 6	36 17 45	34 32 6
	Sun	E.	76 6 2	74 27 35	72 48 50	71 9 49
21	*a* Arietis	W.	79 41 48	81 29 34	83 17 35	85 5 51
	Aldebaran	W.	48 19 44	50 4 47	51 50 14	53 36 4
	Saturn	E.	25 39 50	23 52 37	22 5 9	20 17 27
	Mars	E.	42 24 33	40 41 26	38 58 4	37 14 29
	Sun	E.	62 50 40	61 10 4	59 29 13	57 48 7
22	*a* Arietis	W.	94 10 41	96 0 17	97 50 4	99 40 1
	Aldebaran	W.	62 30 19	64 18 3	66 6 3	67 54 16
	Mars	E.	28 33 42	26 49 5	25 4 22	23 19 34
	Sun	E.	49 19 24	47 37 4	45 54 34	44 11 55
23	*a* Arietis	W.	108 51 59	110 42 43	112 33 32	114 24 24
	Aldebaran	W.	76 58 22	78 47 40	80 37 4	82 26 33
	Pollux	W.	34 11 20	36 1 38	37 52 6	39 42 42
	Jupiter	W.	33 14 20	35 4 11	36 54 9	38 44 12
	Sun	E.	35 36 51	33 53 36	32 10 19	30 27 2
28	Sun	W.	32 35 51	34 11 17	35 46 23	37 21 6
	Antares	E.	30 8 21	28 24 55	26 41 53	24 59 16
	a Aquilæ	E.	85 44 19	84 15 41	82 47 29	81 19 44
	Fomalhaut	E.	110 33 50	108 59 4	107 24 30	105 50 9
29	Sun	W.	45 9 4	46 41 30	48 13 32	49 45 12
	a Aquilæ	E.	74 8 31	72 43 56	71 19 57	69 56 36
	Fomalhaut	E.	98 2 24	96 29 45	94 57 26	93 25 27
30	Sun	W.	57 17 44	58 47 7	60 16 7	61 44 46
	a Aquilæ	E.	63 9 58	61 50 51	60 32 31	59 15 1
	Fomalhaut	E.	85 50 53	84 21 5	82 51 40	81 22 39
	a Pegasi	E.	107 45 46	106 13 10	104 40 52	103 8 51

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
1	Sun	W.	63° 13′ 4″	64° 41′ 0″	66° 8′ 36″	67° 35′ 52″
	α Aquilæ	E.	57 58 23	56 42 39	55 27 50	54 13 59
	Fomalhaut	E.	79 54 2	78 25 48	76 57 58	75 30 33
	α Pegasi	E.	101 37 7	100 5 41	98 34 32	97 3 41
2	Sun	W.	74 47 25	76 12 49	77 37 57	79 2 48
	Antares	W.	15 39 23	17 12 23	18 45 5	20 17 32
	Fomalhaut	E.	68 19 39	66 54 45	65 30 17	64 6 16
	α Pegasi	E.	89 33 45	88 4 37	86 35 46	85 7 11
3	Sun	W.	86 3 18	87 26 43	88 49 55	90 12 56
	Antares	W.	27 55 59	29 26 59	30 57 47	32 28 24
	Fomalhaut	E.	57 13 7	55 51 58	54 31 20	53 11 14
	α Pegasi	E.	77 48 14	76 21 13	74 54 26	73 27 54
4	Sun	W.	97 5 20	98 27 22	99 49 16	101 11 2
	Antares	W.	39 58 50	41 28 28	42 57 58	44 27 22
	Fomalhaut	E.	46 39 41	45 23 22	44 7 49	42 53 4
	α Pegasi	E.	66 18 49	64 53 41	63 28 48	62 4 8
	α Arietis	E.	108 4 17	106 35 0	105 5 51	103 36 49
5	Sun	W.	107 58 26	109 19 41	110 40 53	112 2 2
	Antares	W.	51 52 55	53 21 49	54 50 40	56 19 28
	Fomalhaut	E.	36 53 33	35 45 3	34 37 55	33 32 18
	α Pegasi	E.	55 4 20	53 41 6	52 18 7	50 55 25
	α Arietis	E.	96 12 58	94 44 24	93 15 53	91 47 25
6	Sun	W.	118 47 22	120 8 25	121 29 28	122 50 33
	Antares	W.	63 43 13	65 11 58	66 40 45	68 9 34
	α Pegasi	E.	44 6 27	42 45 43	41 25 24	40 5 33
	α Arietis	E.	84 25 19	82 56 54	81 28 28	80 0 0
7	Sun	W.	129 36 28	130 57 49	132 19 13	133 40 41
	Antares	W.	75 34 19	77 3 28	78 32 42	80 2 2
	α Pegasi	E.	33 35 1	32 19 10	31 4 17	29 50 31
	α Arietis	E.	72 37 1	71 3 14	69 39 22	68 10 26
	Aldebaran	E.	104 30 27	103 2 50	101 35 7	100 7 17
8	Antares	W.	87 30 14	89 0 14	90 30 23	92 0 39
	α Aquilæ	W.	43 42 21	44 43 17	45 45 35	46 49 10
	α Arietis	E.	60 44 19	59 14 46	57 45 6	56 15 18
	Aldebaran	E.	92 46 26	91 17 53	89 49 12	88 20 23
9	α Aquilæ	W.	52 23 53	53 33 46	54 44 31	55 56 5
	Fomalhaut	W.	27 55 0	28 50 21	29 48 33	30 49 19
	α Arietis	E.	48 44 25	47 13 50	45 43 7	44 12 15
	Aldebaran	E.	80 54 8	79 24 26	77 54 36	76 24 35
10	α Aquilæ	W.	62 4 48	63 20 29	64 36 45	65 53 33
	Fomalhaut	W.	36 24 30	37 36 39	38 50 12	40 5 2
	α Arietis	E.	36 35 59	35 4 21	33 32 37	32 0 47
	Aldebaran	E.	68 52 14	67 21 18	65 50 13	64 18 59
	Jupiter	E.	114 3 5	112 31 14	110 59 12	109 26 57
11	α Aquilæ	W.	72 24 54	73 44 29	75 4 27	76 24 47

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Sun	W.	69 2 49	70 29 25	71 55 43	73 21 43
	α Aquilæ	E.	53 1 9	51 49 22	50 38 41	49 29 10
	Fomalhaut	E.	74 3 32	72 36 56	71 10 45	69 44 59
	α Pegasi	E.	95 33 7	94 2 51	92 32 52	91 3 10
2	Sun	W.	80 27 23	81 51 44	83 15 49	84 39 40
	Antares	W.	21 49 42	23 21 38	24 53 19	26 24 46
	Fomalhaut	E.	62 42 42	61 19 35	59 56 57	58 34 47
	α Pegasi	E.	83 38 52	82 10 49	80 43 2	79 15 30
3	Sun	W.	91 35 45	92 58 23	94 20 52	95 43 11
	Antares	W.	33 58 49	35 29 3	36 59 8	38 29 3
	Fomalhaut	E.	51 51 42	50 32 45	49 14 25	47 56 43
	α Pegasi	E.	72 1 37	70 35 34	69 9 45	67 44 10
4	Sun	W.	102 32 42	103 54 16	105 15 44	106 37 7
	Antares	W.	45 56 39	47 25 50	48 54 56	50 23 58
	Fomalhaut	E.	41 39 11	40 26 12	39 14 13	38 3 18
	α Pegasi	E.	60 39 42	59 15 30	57 51 32	56 27 49
	α Arietis	E.	102 7 53	100 39 2	99 10 16	97 41 35
5	Sun	W.	113 23 8	114 44 13	116 5 16	117 26 19
	Antares	W.	57 48 15	59 17 0	60 45 45	62 14 29
	Fomalhaut	E.	32 28 18	31 26 6	30 25 53	29 27 50
	α Pegasi	E.	49 32 59	48 10 52	46 49 3	45 27 34
	α Arietis	E.	90 18 58	88 50 33	87 22 8	85 53 44
6	Sun	W.	124 11 39	125 32 48	126 53 58	128 15 12
	Antares	W.	69 38 24	71 7 18	72 36 14	74 5 14
	α Pegasi	E.	38 46 12	37 27 25	36 9 14	34 51 45
	α Arietis	E.	78 31 30	77 2 58	75 34 22	74 5 43
7	Sun	W.	135 2 14	136 23 51	137 45 34	139 7 21
	Antares	W.	81 31 27	83 0 59	84 30 37	86 0 22
	α Pegasi	E.	28 38 0	27 26 56	26 17 30	25 9 57
	α Arietis	E.	66 41 25	65 12 17	63 43 4	62 13 45
	Aldebaran	E.	98 39 21	97 11 18	95 43 8	94 14 51
8	Antares	W.	93 31 4	95 1 38	96 32 22	98 3 15
	α Aquilæ	W.	47 53 57	48 59 53	50 6 53	51 14 54
	α Arietis	E.	54 45 23	53 15 21	51 45 10	50 14 51
	Aldebaran	E.	86 51 25	85 22 19	83 53 5	82 23 41
9	α Aquilæ	W.	57 8 26	58 21 31	59 35 18	60 49 44
	Fomalhaut	W.	31 52 25	32 57 39	34 4 51	35 13 51
	α Arietis	E.	42 41 16	41 10 8	39 38 53	38 7 29
	Aldebaran	E.	74 54 26	73 24 7	71 53 39	70 23 1
10	α Aquilæ	W.	67 10 52	68 28 41	69 46 59	71 5 43
	Fomalhaut	W.	41 21 4	42 38 13	43 56 22	45 15 29
	α Arietis	E.	30 28 52	28 56 53	27 24 51	25 52 48
	Aldebaran	E.	62 47 37	61 16 5	59 44 26	58 12 38
	Jupiter	E.	107 54 31	106 21 52	104 49 2	103 15 59
11	α Aquilæ	W.	77 45 29	79 6 31	80 27 51	81 49 29

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
11	Fomalhaut	W.	46 35 29	47 56 18	49 17 54	50 40 15
	a Pegasi	W.	25 5 42	26 16 33	27 29 44	28 45 0
	Aldebaran	E.	56 40 42	55 8 40	53 36 31	52 4 15
	Jupiter	E.	101 42 43	100 9 15	98 35 35	97 1 43
12	*a* Aquilæ	W.	83 11 24	84 33 34	85 55 59	87 18 38
	Fomalhaut	W.	57 41 31	59 7 26	60 33 51	62 0 44
	a Pegasi	W.	35 25 29	36 49 21	38 14 13	39 40 0
	Aldebaran	E.	44 21 45	42 49 7	41 16 29	39 43 53
	Pollux	E.	86 11 43	84 36 6	83 0 18	81 24 17
	Jupiter	E.	89 9 14	87 34 7	85 58 48	84 23 16
	Saturn	E.	118 33 44	116 58 33	115 23 11	113 47 36
13	Fomalhaut	W.	69 21 26	70 50 41	72 20 16	73 50 10
	a Pegasi	W.	47 0 12	48 30 9	50 0 38	51 31 37
	Aldebaran	E.	32 2 32	30 30 57	28 59 45	27 29 3
	Pollux	E.	73 21 18	71 44 7	70 6 46	68 29 12
	Jupiter	E.	76 22 36	74 45 52	73 8 56	71 31 48
	Saturn	E.	105 46 40	104 9 52	102 32 53	100 55 43
14	Fomalhaut	W.	81 23 57	82 55 28	84 27 12	85 59 9
	a Pegasi	W.	59 13 14	60 46 43	62 20 34	63 54 45
	Pollux	E.	60 18 42	58 40 3	57 1 15	55 22 16
	Jupiter	E.	63 23 15	61 44 58	60 6 29	58 27 50
	Saturn	E.	92 46 54	91 8 34	89 30 2	87 51 20
	Regulus	E.	97 10 9	95 31 9	93 51 58	92 12 36
15	*a* Pegasi	W.	71 50 10	73 26 4	75 2 13	76 38 37
	a Arietis	W.	28 28 40	30 7 32	31 46 44	33 26 15
	Pollux	E.	47 4 57	45 25 2	43 44 57	42 4 45
	Jupiter	E.	50 11 49	48 32 4	46 52 9	45 12 3
	Saturn	E.	79 35 2	77 55 13	76 15 14	74 35 4
	Regulus	E.	83 53 0	82 12 32	80 31 54	78 51 5
	Mars	E.	108 43 18	107 7 48	105 32 7	103 56 15
	Sun	E.	137 24 4	135 51 38	134 18 59	132 46 8
16	*a* Pegasi	W.	84 43 50	86 21 29	87 59 19	89 37 19
	a Arietis	W.	41 47 51	43 28 53	45 10 9	46 51 38
	Jupiter	E.	36 49 2	35 7 56	33 26 41	31 45 15
	Saturn	E.	66 11 38	64 30 21	62 49 2	61 7 29
	Regulus	E.	70 24 22	68 42 30	67 0 28	65 18 16
	Mars	E.	95 54 18	94 17 23	92 40 19	91 3 3
	Sun	E.	124 58 58	123 24 58	121 50 46	120 16 24
17	*a* Arietis	W.	55 22 8	57 4 49	58 47 42	60 30 45
	Aldebaran	W.	25 3 8	26 37 25	28 12 49	29 49 11
	Saturn	E.	52 37 10	50 54 36	49 11 52	47 28 58
	Regulus	E.	56 44 42	55 1 29	53 18 6	51 34 34
	Mars	E.	82 54 15	81 16 0	79 37 35	77 59 0
	Sun	E.	112 21 51	110 46 25	109 10 49	107 35 2
18	*a* Arietis	W.	69 8 46	70 52 53	72 37 11	74 21 39
	Aldebaran	W.	38 2 7	39 42 24	41 23 9	43 4 18

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
11	Fomalhaut	W.	52 3 17	53 26 57	54 51 14	56 16 6
	a Pegasi	W.	30 2 7	31 20 53	32 41 8	34 2 43
	Aldebaran	E.	50 31 53	48 59 27	47 26 56	45 54 21
	Jupiter	E.	95 27 38	93 53 21	92 18 51	90 44 9
12	*a* Aquilæ	W.	88 41 29	90 4 32	91 27 45	92 51 7
	Fomalhaut	W.	63 28 4	64 55 50	66 23 59	67 52 31
	a Pegasi	W.	41 6 37	42 33 59	44 2 5	45 30 50
	Aldebaran	E.	38 11 20	36 38 53	35 6 34	33 34 26
	Pollux	E.	79 48 5	78 11 41	76 35 5	74 58 17
	Jupiter	E.	82 47 33	81 11 37	79 35 28	77 59 8
	Saturn	E.	112 11 49	110 35 50	108 59 38	107 23 15
13	Fomalhaut	W.	75 20 22	76 50 52	78 21 38	79 52 40
	a Pegasi	W.	53 3 5	54 35 0	56 7 21	57 40 6
	Aldebaran	E.	25 58 59	24 29 40	23 1 20	21 34 12
	Pollux	E.	66 51 28	65 13 33	63 35 26	61 57 9
	Jupiter	E.	69 54 28	68 16 57	66 39 14	65 1 20
	Saturn	E.	99 18 20	97 40 46	96 3 0	94 25 2
14	Fomalhaut	W.	87 31 18	89 3 38	90 36 8	92 8 49
	a Pegasi	W.	65 29 15	67 4 3	68 39 8	70 14 31
	Pollux	E.	53 43 8	52 3 49	50 24 21	48 44 44
	Jupiter	E.	56 49 0	55 9 58	53 30 46	51 51 23
	Saturn	E.	86 12 26	84 33 22	82 54 6	81 14 39
	Regulus	E.	90 33 3	88 53 18	87 13 23	85 33 17
15	*a* Pegasi	W.	78 15 14	79 52 4	81 29 8	83 6 23
	a Arietis	W.	35 6 3	36 46 7	38 26 27	40 7 2
	Pollux	E.	40 24 24	38 43 56	37 3 21	35 22 40
	Jupiter	E.	43 31 47	41 51 21	40 10 45	38 29 59
	Saturn	E.	72 54 44	71 14 13	69 33 32	67 52 40
	Regulus	E.	77 10 5	75 28 55	73 47 34	72 6 3
	Mars	E.	102 20 13	100 44 0	99 7 36	97 31 2
	Sun	E.	131 13 5	129 39 51	128 6 25	126 32 47
16	*a* Pegasi	W.	91 15 29	92 53 49	94 32 17	96 10 55
	a Arietis	W.	48 33 20	50 15 14	51 57 20	53 39 38
	Jupiter	E.	30 3 41	28 21 57	26 40 5	24 58 5
	Saturn	E.	59 25 45	57 43 52	56 1 48	54 19 34
	Regulus	E.	63 35 53	61 53 21	60 10 38	58 27 45
	Mars	E.	89 25 38	87 48 2	86 10 17	84 32 21
	Sun	E.	118 41 51	117 7 7	115 32 12	113 57 7
17	*a* Arietis	W.	62 14 0	63 57 25	65 41 2	67 24 48
	Aldebaran	W.	31 26 25	33 4 24	34 43 3	36 22 19
	Saturn	E.	45 45 55	44 2 42	42 19 19	40 35 47
	Regulus	E.	49 50 51	48 6 59	46 22 57	44 38 45
	Mars	E.	76 20 16	74 41 22	73 2 18	71 23 5
	Sun	E.	105 59 5	104 22 58	102 46 41	101 10 14
18	*a* Arietis	W.	76 6 17	77 51 4	79 36 1	81 21 8
	Aldebaran	W.	44 45 51	46 27 45	48 9 59	49 52 32

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
18	Saturn	E.	38 52 5	37 8 14	35 24 14	33 40 4
	Regulus	E.	42 54 24	41 9 53	39 25 13	37 40 24
	Mars	E.	69 43 43	68 4 11	66 24 31	64 44 42
	Sun	E.	99 33 38	97 56 51	96 19 55	94 42 49
19	α Arietis	W.	83 6 23	84 51 48	86 37 22	88 23 5
	Aldebaran	W.	51 35 23	53 18 31	55 1 54	56 45 32
	Regulus	E.	28 54 4	27 8 23	25 22 34	23 36 37
	Mars	E.	56 23 26	54 42 46	53 1 59	51 21 4
	Sun	E.	86 35 2	84 57 1	83 18 52	81 40 35
20	Aldebaran	W.	65 27 3	67 11 57	68 57 0	70 42 13
	Pollux	W.	22 40 3	24 24 59	26 10 18	27 55 55
	Jupiter	W.	18 42 46	20 28 37	22 14 40	24 0 54
	Mars	E.	42 54 52	41 13 21	39 31 46	37 50 7
	Sun	E.	73 27 8	71 48 4	70 8 54	68 29 37
21	Aldebaran	W.	79 30 26	81 16 26	83 2 31	84 48 41
	Pollux	W.	36 47 41	38 34 36	40 21 38	42 8 49
	Jupiter	W.	32 54 19	34 41 22	36 28 31	38 15 45
	Mars	E.	29 21 28	27 39 48	25 58 14	24 16 47
	Sun	E.	60 11 50	58 32 3	56 52 12	55 12 18
22	Aldebaran	W.	93 40 25	95 26 51	97 13 18	98 59 44
	Pollux	W.	51 6 6	52 53 45	54 41 27	56 29 10
	Jupiter	W.	47 12 54	49 0 28	50 48 3	52 35 40
	Saturn	W.	17 48 30	19 35 41	21 22 57	23 10 16
	Sun	E.	46 52 25	45 12 26	43 32 29	41 52 35
23	Pollux	W.	65 27 45	67 15 23	69 2 57	70 50 28
	Jupiter	W.	61 33 31	63 20 59	65 8 24	66 55 44
	Saturn	W.	32 7 4	33 54 23	35 41 38	37 28 49
	Regulus	W.	28 27 30	30 15 24	32 3 14	33 51 0
	Sun	E.	33 34 16	31 54 59	30 15 54	28 37 1
28	Sun	W.	31 34 50	33 4 27	34 33 49	36 2 55
	α Aquilæ	E.	61 56 22	60 36 24	59 17 15	57 58 58
	Fomalhaut	E.	84 38 20	83 7 31	81 37 3	80 6 59
	α Pegasi	E.	106 23 46	104 49 51	103 16 11	101 42 47
29	Sun	W.	43 24 17	44 51 42	46 18 50	47 45 40
	Antares	W.	10 57 39	12 33 15	14 8 32	15 43 31
	α Aquilæ	E.	51 41 47	50 29 33	49 18 30	48 8 43
	Fomalhaut	E.	72 42 34	71 14 56	69 47 45	68 21 1
	α Pegasi	E.	94 0 3	92 28 23	90 57 0	89 25 56
30	Sun	W.	54 55 43	56 20 54	57 45 50	59 10 31
	Antares	W.	23 33 49	25 7 1	26 39 56	28 12 35
	Fomalhaut	E.	61 14 26	59 50 37	58 27 20	57 4 36
	α Pegasi	E.	81 55 3	80 25 46	78 56 48	77 28 7
31	Sun	W.	66 10 21	67 33 39	68 56 44	70 19 38
	Antares	W.	35 52 5	37 23 17	38 54 17	40 25 5
	Fomalhaut	E.	50 19 50	49 0 49	47 42 31	46 24 59
	α Pegasi	E.	70 9 6	68 42 10	67 15 32	65 49 10

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
18	Saturn	E.	31 55 46	30 11 20	28 26 45	26 42 2
	Regulus	E.	35 55 25	34 10 18	32 25 2	30 39 37
	Mars	E.	63 4 43	61 24 36	59 44 21	58 3 57
	Sun	E.	93 5 34	91 28 10	89 50 36	88 12 53
19	α Arietis	W.	90 8 56	91 54 56	93 41 4	95 27 19
	Aldebaran	W.	58 29 25	60 13 31	61 57 50	63 42 21
	Regulus	E.	21 50 33	20 4 23	18 18 8	16 31 48
	Mars	E.	49 40 2	47 58 54	46 17 39	44 36 18
	Sun	E.	80 2 9	78 23 35	76 44 53	75 6 4
20	Aldebaran	W.	72 27 36	74 13 7	75 58 46	77 44 33
	Pollux	W.	29 41 50	31 27 59	33 14 22	35 0 56
	Jupiter	W.	25 47 19	27 33 52	29 20 34	31 7 23
	Mars	E.	36 8 25	34 26 41	32 44 56	31 3 11
	Sun	E.	66 50 14	65 10 46	63 31 12	61 51 33
21	Aldebaran	W.	86 34 56	88 21 14	90 7 35	91 53 59
	Pollux	W.	43 56 6	45 43 29	47 30 57	49 18 29
	Jupiter	W.	40 3 3	41 50 26	43 37 52	45 25 22
	Mars	E.	22 35 31	20 54 31	19 13 50	17 33 37
	Sun	E.	53 32 22	51 52 24	50 12 25	48 32 25
22	Aldebaran	W.	100 46 9	102 32 32	104 18 52	106 5 9
	Pollux	W.	58 16 54	60 4 38	61 52 22	63 40 4
	Jupiter	W.	54 23 16	56 10 52	57 58 27	59 46 0
	Saturn	W.	24 57 37	26 44 59	28 32 22	30 19 44
	Sun	E.	40 12 44	38 32 57	36 53 16	35 13 42
23	Pollux	W.	72 37 54	74 25 14	76 12 28	77 59 35
	Jupiter	W.	68 42 59	70 30 8	72 17 12	74 4 8
	Saturn	W.	39 15 56	41 2 57	42 49 52	44 36 41
	Regulus	W.	35 38 42	37 26 18	39 13 48	41 1 11
	Sun	E.	26 58 24	25 20 5	23 42 6	22 4 33
28	Sun	W.	37 31 45	39 0 18	40 28 35	41 56 34
	α Aquilæ	E.	56 41 34	55 25 6	54 9 37	52 55 10
	Fomalhaut	E.	78 37 17	77 7 59	75 39 6	74 10 37
	α Pegasi	E.	100 9 40	98 36 50	97 4 17	95 32 1
29	Sun	W.	49 12 14	50 38 31	52 4 31	53 30 15
	Antares	W.	17 18 11	18 52 32	20 26 35	22 0 21
	α Aquilæ	E.	47 0 15	45 53 11	44 47 35	43 43 32
	Fomalhaut	E.	66 54 44	65 28 56	64 3 36	62 38 46
	α Pegasi	E.	87 55 9	86 24 41	84 54 30	83 24 38
30	Sun	W.	60 34 57	61 59 9	63 23 6	64 46 50
	Antares	W.	29 44 58	31 17 7	32 49 0	34 20 39
	Fomalhaut	E.	55 42 26	54 20 51	52 59 52	51 39 31
	α Pegasi	E.	75 59 44	74 31 38	73 3 50	71 36 19
31	Sun	W.	71 42 21	73 4 53	74 27 14	75 49 27
	Antares	W.	41 55 40	43 26 5	44 56 20	46 26 24
	Fomalhaut	E.	45 8 14	43 52 20	42 37 20	41 23 16
	α Pegasi	E.	64 23 6	62 57 19	61 31 50	60 6 37

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
1	Sun	W.	77° 11′ 30″	78° 33′ 24″	79° 55′ 10″	81° 16′ 49″
	Fomalhaut	E.	40 10 14	38 58 17	37 47 30	36 37 59
	α Pegasi	E.	58 41 43	57 17 6	55 52 47	54 28 46
	α Arietis	E.	100 7 24	98 37 58	97 8 41	95 39 31
2	Sun	W.	88 3 30	89 24 36	90 45 39	92 6 38
	α Pegasi	E.	47 33 33	46 11 33	44 49 57	43 28 47
	α Arietis	E.	88 15 14	86 46 36	85 18 3	83 49 32
3	Sun	W.	98 51 15	100 12 10	101 33 6	102 54 4
	α Pegasi	E.	36 50 16	35 32 22	34 15 12	32 58 52
	α Arietis	E.	76 27 21	74 58 55	73 30 28	72 2 0
	Aldebaran	E.	108 21 35	106 54 20	105 27 3	103 59 42
4	Sun	W.	109 39 41	111 1 1	112 22 27	113 43 59
	α Aquilæ	W.	40 58 55	41 55 54	42 54 27	43 54 28
	α Arietis	E.	64 38 53	63 10 3	61 41 8	60 12 7
	Aldebaran	E.	96 41 52	95 14 2	93 46 6	92 18 3
5	Sun	W.	120 33 28	121 55 46	123 18 14	124 40 51
	α Aquilæ	W.	49 13 55	50 21 11	51 29 27	52 38 39
	α Arietis	E.	52 45 20	51 15 35	49 45 42	48 15 39
	Aldebaran	E.	84 55 51	83 26 59	81 57 58	80 28 46
6	α Aquilæ	W.	58 37 16	59 51 15	61 5 54	62 21 13
	Fomalhaut	W.	33 22 43	34 29 51	35 38 46	36 49 19
	α Arietis	E.	40 43 6	39 12 6	37 40 56	36 9 37
	Aldebaran	E.	73 0 12	71 29 56	69 59 28	68 28 48
	Jupiter	E.	119 53 9	118 21 28	116 49 34	115 17 27
7	α Aquilæ	W.	68 46 41	70 5 24	71 24 37	72 44 19
	Fomalhaut	W.	43 2 54	44 21 8	45 40 22	47 0 32
	α Pegasi	W.	22 2 26	23 5 41	24 12 16	25 21 47
	Aldebaran	E.	60 52 33	59 20 42	57 48 40	56 16 26
	Pollux	E.	103 4 17	101 30 48	99 57 2	98 23 1
	Jupiter	E.	107 33 8	105 59 30	104 25 35	102 51 25
8	α Aquilæ	W.	79 29 20	80 51 31	82 14 4	83 36 58
	Fomalhaut	W.	53 53 45	55 18 35	56 44 4	58 10 9
	α Pegasi	W.	31 43 8	33 4 37	34 27 27	35 51 31
	Aldebaran	E.	48 32 26	46 59 22	45 26 0	43 52 31
	Pollux	E.	90 28 49	88 53 8	87 17 11	85 40 57
	Jupiter	E.	94 56 24	93 20 33	91 44 25	90 8 0
9	α Aquilæ	W.	90 35 56	92 0 30	93 25 18	94 50 17
	Fomalhaut	W.	65 29 0	66 58 18	68 28 2	69 58 13
	α Pegasi	W.	43 7 6	44 36 47	46 7 10	47 38 14
	Aldebaran	E.	36 4 17	34 30 42	32 57 14	31 23 59
	Pollux	E.	77 35 36	75 57 41	74 19 31	72 41 5
	Jupiter	E.	82 1 38	80 23 31	78 45 7	77 6 26
	Saturn	E.	111 55 20	110 17 33	108 39 28	107 1 7
10	Fomalhaut	W.	77 35 3	79 7 29	80 40 14	82 13 17
	α Pegasi	W.	55 22 23	56 56 46	58 31 37	60 6 54

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Sun	W.	82 38 20	83 59 46	85 21 5	86 42 20
	Fomalhaut	E.	35 29 50	34 23 10	33 18 7	32 14 49
	α Pegasi	E.	53 5 4	51 41 40	50 18 37	48 55 54
	α Arietis	E.	94 10 28	92 41 32	91 12 41	89 43 55
2	Sun	W.	93 27 36	94 48 32	96 9 26	97 30 21
	α Pegasi	E.	42 8 3	40 47 47	39 28 2	38 8 51
	α Arietis	E.	82 21 3	80 52 37	79 24 11	77 55 46
3	Sun	W.	104 15 5	105 36 8	106 57 15	108 18 25
	α Pegasi	E.	31 43 27	30 29 4	29 15 52	28 3 59
	α Arietis	E.	70 33 29	69 4 55	67 36 19	66 7 38
	Aldebaran	E.	102 32 17	101 4 48	99 37 15	98 9 36
4	Sun	W.	115 5 38	116 27 24	117 49 17	119 11 18
	α Aquilæ	W.	44 55 53	45 58 36	47 2 33	48 7 41
	α Arietis	E.	58 43 0	57 13 46	55 44 25	54 14 56
	Aldebaran	E.	90 49 53	89 21 35	87 53 9	86 24 34
5	Sun	W.	126 3 39	127 26 36	128 49 45	130 13 4
	α Aquilæ	W.	53 48 45	54 59 41	56 11 27	57 23 59
	α Arietis	E.	46 45 28	45 15 7	43 44 37	42 13 56
	Aldebaran	E.	78 59 25	77 29 53	76 0 10	74 30 17
6	α Aquilæ	W.	63 37 9	64 53 42	66 10 49	67 28 29
	Fomalhaut	W.	38 1 24	39 14 54	40 29 43	41 45 44
	α Arietis	E.	34 38 8	33 6 29	31 34 43	30 2 48
	Aldebaran	E.	66 57 57	65 26 54	63 55 39	62 24 12
	Jupiter	E.	113 45 5	112 12 29	110 39 37	109 6 30
7	α Aquilæ	W.	74 4 28	75 25 4	76 46 5	78 7 31
	Fomalhaut	W.	48 21 36	49 43 29	51 6 10	52 29 36
	α Pegasi	W.	26 33 54	27 48 20	29 4 50	30 23 9
	Aldebaran	E.	54 44 1	53 11 25	51 38 38	50 5 42
	Pollux	E.	96 48 44	95 14 10	93 39 20	92 4 12
	Jupiter	E.	101 16 58	99 42 15	98 7 14	96 31 58
8	α Aquilæ	W.	85 0 11	86 23 42	87 47 31	89 11 36
	Fomalhaut	W.	59 36 51	61 4 6	62 31 53	64 0 12
	α Pegasi	W.	37 16 43	38 42 57	40 10 8	41 38 13
	Aldebaran	E.	42 18 57	40 45 19	39 11 38	37 37 57
	Pollux	E.	84 4 26	82 27 38	80 50 34	79 13 13
	Jupiter	E.	88 31 18	86 54 19	85 17 3	83 39 29
9	α Aquilæ	W.	96 15 26	97 40 45	99 6 11	100 31 44
	Fomalhaut	W.	71 28 49	72 59 49	74 31 12	76 2 57
	α Pegasi	W.	49 9 56	50 42 13	52 15 5	53 48 29
	Aldebaran	E.	29 50 59	28 18 21	26 46 13	25 14 41
	Pollux	E.	71 2 23	69 23 25	67 44 11	66 4 42
	Jupiter	E.	75 27 29	73 48 15	72 8 45	70 28 59
	Saturn	E.	105 22 29	103 43 35	102 4 25	100 24 59
10	Fomalhaut	W.	83 46 37	85 20 14	86 54 5	88 28 10
	α Pegasi	W.	61 42 35	63 18 40	64 55 8	66 31 57

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
10	Pollux	E.	64 24 58	62 45 0	61 4 47	59 24 20
	Jupiter	E.	68 48 58	67 8 40	65 28 8	63 47 20
	Saturn	E.	98 45 17	97 5 20	95 25 7	93 44 39
	Regulus	E.	101 17 3	99 36 43	97 56 7	96 15 17
11	Fomalhaut	W.	90 2 29	91 37 0	93 11 41	94 46 32
	α Pegasi	W.	68 9 6	69 46 35	71 24 22	73 2 27
	α Arietis	W.	24 40 21	26 20 29	28 1 4	29 42 4
	Pollux	E.	50 58 49	49 17 6	47 35 13	45 53 9
	Jupiter	E.	55 19 45	53 37 33	51 55 9	50 12 32
	Saturn	E.	85 18 44	83 36 53	81 54 48	80 12 31
	Regulus	E.	87 47 29	86 5 15	84 22 48	82 40 9
12	α Pegasi	W.	81 16 39	82 56 9	84 35 51	86 15 43
	α Arietis	W.	38 11 57	39 54 45	41 37 46	43 21 1
	Pollux	E.	37 20 39	35 37 49	33 54 54	32 11 55
	Jupiter	E.	41 36 34	39 52 51	38 8 58	36 24 56
	Saturn	E.	71 38 13	69 54 49	68 11 15	66 27 33
	Regulus	E.	74 4 0	72 20 14	70 36 19	68 52 14
	Mars	E.	116 29 29	114 50 54	113 12 10	111 33 15
13	α Pegasi	W.	94 37 12	96 17 50	97 58 33	99 39 19
	α Arietis	W.	52 0 5	53 44 22	55 28 48	57 13 22
	Aldebaran	W.	21 54 12	23 27 38	25 2 37	26 38 52
	Jupiter	E.	27 42 47	25 58 1	24 13 9	22 28 13
	Saturn	E.	57 46 52	56 2 22	54 17 45	52 33 2
	Regulus	E.	60 9 45	58 24 52	56 39 54	54 54 49
	Mars	E.	103 16 27	101 36 42	99 56 50	98 16 52
14	α Arietis	W.	65 57 50	67 43 0	69 28 15	71 13 34
	Aldebaran	W.	34 53 21	36 34 7	38 15 19	39 56 54
	Saturn	E.	43 48 10	42 2 59	40 17 45	38 32 27
	Regulus	E.	46 8 6	44 22 32	42 36 55	40 51 14
	Mars	E.	89 55 38	88 15 9	86 34 37	84 54 1
	Sun	E.	129 46 50	128 9 24	126 31 52	124 54 16
15	α Arietis	W.	80 0 57	81 46 33	83 32 11	85 17 51
	Aldebaran	W.	48 29 15	50 12 23	51 55 41	53 39 8
	Saturn	E.	29 45 33	28 0 8	26 14 44	24 29 21
	Regulus	E.	32 2 18	30 16 27	28 30 35	26 44 42
	Mars	E.	76 30 26	74 49 37	73 8 48	71 27 58
	Spica	E.	86 5 9	84 19 15	82 33 19	80 47 22
	Sun	E.	116 45 14	115 7 17	113 29 17	111 51 15
16	α Arietis	W.	94 6 20	95 52 3	97 37 45	99 23 27
	Aldebaran	W.	62 18 4	64 2 7	65 46 12	67 30 20
	Pollux	W.	19 38 30	21 21 44	23 5 23	24 49 21
	Jupiter	W.	14 43 4	16 28 45	18 14 33	20 0 25
	Mars	E.	63 3 48	61 23 1	59 42 14	58 1 30
	Spica	E.	71 57 27	70 11 27	68 25 28	66 39 30
	Sun	E.	103 40 47	102 2 40	100 24 32	98 46 25
17	Aldebaran	W.	76 11 28	77 55 44	79 40 0	81 24 15
	Pollux	W.	33 32 8	35 17 3	37 2 1	38 47 2

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
10	Pollux	E.	57 43 39	56 2 45	54 21 39	52 40 20
	Jupiter	E.	62 6 17	60 25 0	58 43 29	57 1 44
	Saturn	E.	92 3 56	90 22 59	88 41 48	87 0 23
	Regulus	E.	94 34 11	92 52 51	91 11 18	89 29 30
11	Fomalhaut	W.	96 21 32	97 56 40	99 31 54	101 7 13
	a Pegasi	W.	74 40 48	76 19 24	77 58 15	79 37 21
	a Arietis	W.	31 23 25	33 5 6	34 47 6	36 29 23
	Pollux	E.	44 10 56	42 28 33	40 46 3	39 3 24
	Jupiter	E.	48 29 43	46 46 42	45 3 30	43 20 8
	Saturn	E.	78 30 2	76 47 21	75 4 29	73 21 26
	Regulus	E.	80 57 18	79 14 15	77 31 1	75 47 36
12	*a* Pegasi	W.	87 55 45	89 35 55	91 16 14	92 56 40
	a Arietis	W.	45 4 29	46 48 7	48 31 57	50 15 56
	Pollux	E.	30 28 55	28 45 54	27 2 55	25 20 1
	Jupiter	E.	34 40 46	32 56 27	31 12 1	29 27 27
	Saturn	E.	64 43 41	62 59 40	61 15 32	59 31 16
	Regulus	E.	67 8 0	65 23 38	63 39 8	61 54 30
	Mars	E.	109 54 11	108 14 57	106 35 35	104 56 5
13	*a* Pegasi	W.	101 20 9	103 1 1	104 41 53	106 22 47
	a Arietis	W.	58 58 3	60 42 51	62 27 45	64 12 45
	Aldebaran	W.	28 16 11	29 54 25	31 33 25	33 13 6
	Jupiter	E.	20 43 12	18 58 9	17 13 5	15 28 0
	Saturn	E.	50 48 13	49 3 19	47 18 21	45 33 17
	Regulus	E.	53 9 38	51 24 22	49 39 1	47 53 36
	Mars	E.	96 36 47	94 56 37	93 16 22	91 36 2
14	*a* Arietis	W.	72 58 57	74 44 22	76 29 51	78 15 23
	Aldebaran	W.	41 38 50	43 21 4	45 3 34	46 46 18
	Saturn	E.	36 47 8	35 1 46	33 16 22	31 30 58
	Regulus	E.	39 5 31	37 19 46	35 33 58	33 48 9
	Mars	E.	83 13 22	81 32 41	79 51 58	78 11 13
	Sun	E.	123 16 35	121 38 50	120 1 1	118 23 9
15	*a* Arietis	W.	87 3 32	88 49 13	90 34 55	92 20 38
	Aldebaran	W.	55 22 43	57 6 25	58 50 13	60 34 6
	Saturn	E.	22 44 0	20 58 42	19 13 29	17 28 22
	Regulus	E.	24 58 51	23 13 0	21 27 11	19 41 25
	Mars	E.	69 47 7	68 6 17	66 25 27	64 44 37
	Spica	E.	79 1 24	77 15 25	75 29 26	73 43 26
	Sun	E.	110 13 12	108 35 7	106 57 1	105 18 54
16	*a* Arietis	W.	101 9 7	102 54 47	104 40 25	106 26 2
	Aldebaran	W.	69 14 31	70 58 44	72 42 58	74 27 13
	Pollux	W.	26 33 34	28 18 0	30 2 35	31 47 19
	Jupiter	W.	21 46 20	23 32 16	25 18 14	27 4 12
	Mars	E.	56 20 48	54 40 8	52 59 31	51 18 56
	Spica	E.	64 53 33	63 7 36	61 21 41	59 35 47
	Sun	E.	97 8 18	95 30 12	93 52 6	92 14 1
17	Aldebaran	W.	83 8 29	84 52 42	86 36 53	88 21 2
	Pollux	W.	40 32 5	42 17 10	44 2 16	45 47 22

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
17	Jupiter	W.	28 50 11	30 36 9	32 22 8	34 8 5
	Mars	E.	49 38 26	47 57 59	46 17 37	44 37 19
	Spica	E.	57 49 55	56 4 4	54 18 15	52 32 29
	Sun	E.	90 35 58	88 57 56	87 19 56	85 41 57
18	Aldebaran	W.	90 5 9	91 49 13	93 33 14	95 17 12
	Pollux	W.	47 32 29	49 17 34	51 2 39	52 47 42
	Jupiter	W.	42 57 30	44 43 18	46 29 3	48 14 45
	Saturn	W.	12 46 13	14 30 24	16 14 49	17 59 22
	Mars	E.	36 17 25	34 37 50	32 58 25	31 19 13
	Spica	E.	43 44 17	41 58 48	40 13 24	38 28 3
	Sun	E.	77 32 38	75 54 54	74 17 13	72 39 36
19	Pollux	W.	61 32 27	63 17 15	65 2 0	66 46 41
	Jupiter	W.	57 2 31	58 47 53	60 33 12	62 18 26
	Saturn	W.	26 42 49	28 27 30	30 12 8	31 56 44
	Regulus	W.	24 31 19	26 16 20	28 1 19	29 46 14
	Mars	E.	23 7 14	21 30 2	19 53 25	18 17 32
	Spica	E.	29 42 36	27 57 49	26 13 10	24 28 40
	Sun	E.	64 32 28	62 55 16	61 18 9	59 41 7
20	Pollux	W.	75 28 59	77 13 11	78 57 18	80 41 18
	Jupiter	W.	71 3 25	72 48 9	74 32 47	76 17 19
	Saturn	W.	40 38 46	42 22 57	44 7 2	45 51 1
	Regulus	W.	38 29 49	40 14 17	41 58 39	43 42 55
	Sun	E.	51 37 30	50 1 7	48 24 52	46 48 45
21	Pollux	W.	89 19 34	91 2 50	92 45 58	94 28 57
	Jupiter	W.	84 58 14	86 42 2	88 25 43	90 9 14
	Saturn	W.	54 29 19	56 12 36	57 55 46	59 38 47
	Regulus	W.	52 22 32	54 6 6	55 49 30	57 32 47
	Sun	E.	38 50 32	37 15 25	35 40 31	34 5 50
26	Sun	W.	23 17 41	24 42 59	26 8 14	27 33 24
	Fomalhaut	E.	65 30 0	64 4 12	62 38 53	61 14 2
	α Pegasi	E.	86 18 36	84 47 38	83 16 55	81 46 29
27	Sun	W.	34 37 13	36 1 30	37 25 37	38 49 33
	Fomalhaut	E.	54 17 46	52 56 15	51 35 24	50 15 13
	α Pegasi	E.	74 18 25	72 49 39	71 21 11	69 53 0
	α Arietis	E.	116 31 15	114 58 53	113 26 44	111 54 47
28	Sun	W.	45 46 37	47 9 31	48 32 15	49 54 49
	Fomalhaut	E.	43 45 48	42 30 33	41 16 19	40 3 10
	α Pegasi	E.	62 36 32	61 10 9	59 44 5	58 18 21
	α Arietis	E.	104 18 15	102 47 32	101 17 0	99 46 40
29	Sun	W.	56 45 26	58 7 9	59 28 45	60 50 15
	Fomalhaut	E.	34 16 44	33 12 6	32 9 19	31 8 35
	α Pegasi	E.	51 14 41	49 51 1	48 27 45	47 4 52
	α Arietis	E.	92 17 23	90 47 58	89 18 42	87 49 32
30	Sun	W.	67 36 16	68 57 14	70 18 9	71 39 2
	α Pegasi	E.	40 17 19	38 57 23	37 38 3	36 19 24
	α Arietis	E.	80 25 21	78 56 45	77 28 14	75 59 47

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
17	Jupiter	W.	35 54 1	37 39 56	39 25 49	41 11 41
	Mars	E.	42 57 7	41 17 1	39 37 1	37 57 9
	Spica	E.	50 46 45	49 1 4	47 15 25	45 29 49
	Sun	E.	84 4 1	82 26 6	80 48 14	79 10 24
18	Aldebaran	W.	97 1 6	98 44 56	100 28 42	102 12 23
	Pollux	W.	54 32 44	56 17 43	58 2 41	59 47 35
	Jupiter	W.	50 0 24	51 46 1	53 31 34	55 17 4
	Saturn	W.	19 44 0	21 28 41	23 13 24	24 58 7
	Mars	E.	29 40 13	28 1 29	26 23 2	24 44 56
	Spica	E.	36 42 47	34 57 36	33 12 30	31 27 30
	Sun	E.	71 2 2	69 24 33	67 47 7	66 9 45
19	Pollux	W.	68 31 18	70 15 51	72 0 19	73 44 42
	Jupiter	W.	64 3 36	65 48 41	67 33 41	69 18 36
	Saturn	W.	33 41 16	35 25 45	37 10 10	38 54 31
	Regulus	W.	31 31 6	33 15 54	35 0 37	36 45 16
	Mars	E.	16 42 34	15 8 47	13 36 35	12 6 31
	Spica	E.	22 44 19	21 0 9	19 16 13	17 32 33
	Sun	E.	58 4 11	56 27 21	54 50 37	53 14 0
20	Pollux	W.	82 25 11	84 8 58	85 52 37	87 36 9
	Jupiter	W.	78 1 44	79 46 2	81 30 14	83 14 18
	Saturn	W.	47 34 54	49 18 41	51 2 21	52 45 53
	Regulus	W.	45 27 4	47 11 7	48 55 3	50 38 52
	Sun	E.	45 12 47	43 36 58	42 1 19	40 25 50
21	Pollux	W.	96 11 47	97 54 28	99 36 59	101 19 20
	Jupiter	W.	91 52 37	93 35 51	95 18 56	97 1 50
	Saturn	W.	61 21 40	63 4 23	64 46 57	66 29 22
	Regulus	W.	59 15 54	60 58 52	62 41 41	64 24 20
	Sun	E.	32 31 23	30 57 11	29 23 16	27 49 39
26	Sun	W.	28 58 27	30 23 22	31 48 8	33 12 46
	Fomalhaut	E.	59 49 41	58 25 52	57 2 36	55 39 53
	α Pegasi	E.	80 16 19	78 46 25	77 16 48	75 47 28
27	Sun	W.	40 13 19	41 36 54	43 0 19	44 23 33
	Fomalhaut	E.	48 55 44	47 37 1	46 19 6	45 2 0
	α Pegasi	E.	68 25 6	66 57 30	65 30 13	64 3 13
	α Arietis	E.	110 23 4	108 51 34	107 20 16	105 49 9
28	Sun	W.	51 17 14	52 39 29	54 1 36	55 23 35
	Fomalhaut	E.	38 51 10	37 40 25	36 31 2	35 23 5
	α Pegasi	E.	56 52 56	55 27 51	54 3 7	52 38 43
	α Arietis	E.	98 16 29	96 46 28	95 16 38	93 46 56
29	Sun	W.	62 11 38	63 32 55	64 54 6	66 15 13
	Fomalhaut	E.	30 10 3	29 13 57	28 20 28	27 29 52
	α Pegasi	E.	45 42 25	44 20 25	42 58 53	41 37 50
	α Arietis	E.	86 20 30	84 51 34	83 22 44	81 54 0
30	Sun	W.	72 59 52	74 20 41	75 41 28	77 2 15
	α Pegasi	E.	35 1 29	33 44 22	32 28 8	31 12 53
	α Arietis	E.	74 31 22	73 2 59	71 34 39	70 6 19

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Sun	W.	78 23 2	79 43 49	81 4 38	82 25 28
	a Arietis	E.	68 38 0	67 9 42	65 41 22	64 13 2
	Aldebaran	E.	100 42 42	99 15 26	97 48 8	96 20 48
2	Sun	W.	89 10 25	90 31 38	91 52 56	93 14 21
	a Aquilæ	W.	46 2 41	47 6 38	48 11 40	49 17 44
	a Arietis	E.	56 50 47	55 22 9	53 53 27	52 24 39
	Aldebaran	E.	89 3 20	87 35 37	86 7 49	84 39 54
3	Sun	W.	100 3 23	101 25 39	102 48 6	104 10 44
	a Aquilæ	W.	55 1 46	56 13 1	57 24 59	58 37 39
	a Arietis	E.	44 59 7	43 29 39	42 0 2	40 30 16
	Aldebaran	E.	77 18 36	75 49 55	74 21 5	72 52 6
4	Sun	W.	111 6 57	112 30 52	113 55 2	115 19 28
	a Aquilæ	W.	64 50 35	66 6 56	67 23 49	68 41 14
	Fomalhaut	W.	39 27 11	40 40 44	41 55 30	43 11 24
	Aldebaran	E.	65 24 29	63 54 24	62 24 6	60 53 36
	Pollux	E.	107 37 6	106 5 36	104 33 51	103 1 50
	Jupiter	E.	111 22 29	109 50 8	108 17 33	106 44 41
5	Sun	W.	122 25 38	123 51 43	125 18 7	126 44 49
	a Aquilæ	W.	75 15 43	76 36 0	77 56 43	79 17 52
	Fomalhaut	W.	49 45 39	51 7 8	52 29 23	53 52 23
	a Pegasi	W.	27 38 20	28 54 19	30 12 7	31 31 34
	Aldebaran	E.	53 18 0	51 46 15	50 14 18	48 42 9
	Pollux	E.	95 17 33	93 43 49	92 9 45	90 35 23
	Jupiter	E.	98 56 10	97 21 34	95 46 39	94 11 25
6	*a* Aquilæ	W.	86 9 29	87 32 54	88 56 40	90 20 45
	Fomalhaut	W.	60 57 41	62 24 38	63 52 11	65 20 18
	a Pegasi	W.	38 28 53	39 55 40	41 23 24	42 52 0
	Aldebaran	E.	40 58 47	39 25 41	37 52 30	36 19 16
	Pollux	E.	82 38 33	81 2 10	79 25 26	77 48 21
	Jupiter	E.	86 10 13	84 32 57	82 55 19	81 17 19
	Saturn	E.	117 41 33	116 4 56	114 27 57	112 50 37
7	Fomalhaut	W.	72 48 53	74 20 5	75 51 46	77 23 53
	a Pegasi	W.	50 26 42	51 59 44	53 33 23	55 7 39
	Aldebaran	E.	28 34 2	27 1 43	25 29 54	23 58 46
	Pollux	E.	69 37 35	67 58 22	66 18 47	64 38 51
	Jupiter	E.	73 1 53	71 21 42	69 41 9	68 0 13
	Saturn	E.	104 38 28	102 58 55	101 19 1	99 38 45
8	Fomalhaut	W.	85 10 47	86 45 19	88 20 11	89 55 23
	a Pegasi	W.	63 7 16	64 44 43	66 22 39	68 1 1
	Pollux	E.	56 13 59	54 32 0	52 49 42	51 7 5
	Jupiter	E.	59 30 8	57 47 3	56 3 36	54 19 49
	Saturn	E.	91 11 54	89 29 28	87 46 40	86 3 33
	Regulus	E.	93 4 21	91 21 53	89 39 4	87 55 55
9	*a* Pegasi	W.	76 19 7	77 59 52	79 40 58	81 22 23
	a Arietis	W.	33 4 34	34 48 28	36 32 45	38 17 25
	Pollux	E.	42 29 36	40 45 18	39 0 47	37 16 3

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Sun	W.	83 46 20	85 7 15	86 28 14	87 49 17
	α Arietis	E.	62 44 40	61 16 17	59 47 50	58 19 20
	Aldebaran	E.	94 53 26	93 26 0	91 58 31	90 30 58
2	Sun	W.	94 35 53	95 57 33	97 19 21	98 41 17
	α Aquilæ	W.	50 24 47	51 32 45	52 41 36	53 51 17
	α Arietis	E.	50 55 46	49 26 47	47 57 41	46 28 28
	Aldebaran	E.	83 11 54	81 43 46	80 15 30	78 47 7
3	Sun	W.	105 33 33	106 56 34	108 19 48	109 43 16
	α Aquilæ	W.	59 51 0	61 4 59	62 19 35	63 34 48
	α Arietis	E.	39 0 22	37 30 19	36 0 7	34 29 46
	Aldebaran	E.	71 22 56	69 53 36	68 24 5	66 54 23
4	Sun	W.	116 44 9	118 9 6	119 34 19	120 59 50
	α Aquilæ	W.	69 59 10	71 17 36	72 36 30	73 55 53
	Fomalhaut	W.	44 28 21	45 46 18	47 5 12	48 25 0
	Aldebaran	E.	59 22 54	57 52 0	56 20 52	54 49 33
	Pollux	E.	101 29 33	99 56 59	98 24 8	96 51 0
	Jupiter	E.	105 11 33	103 38 9	102 4 27	100 30 27
5	Sun	W.	128 11 49	129 39 8	131 6 47	132 34 44
	α Aquilæ	W.	80 39 25	82 1 22	83 23 42	84 46 24
	Fomalhaut	W.	55 16 6	56 40 31	58 5 36	59 31 20
	α Pegasi	W.	32 52 31	34 14 49	35 38 22	37 3 5
	Aldebaran	E.	47 9 49	45 37 18	44 4 37	42 31 46
	Pollux	E.	89 0 41	87 25 39	85 50 18	84 14 36
	Jupiter	E.	92 35 51	90 59 58	89 23 43	87 47 9
6	α Aquilæ	W.	91 45 8	93 9 49	94 34 46	95 59 59
	Fomalhaut	W.	66 48 58	68 18 11	69 47 55	71 18 9
	α Pegasi	W.	44 21 26	45 51 40	47 22 39	48 54 20
	Aldebaran	E.	34 46 1	33 12 48	31 39 41	30 6 44
	Pollux	E.	76 10 54	74 33 6	72 54 57	71 16 27
	Jupiter	E.	79 38 58	78 0 15	76 21 10	74 41 43
	Saturn	E.	111 12 55	109 34 51	107 56 25	106 17 38
7	Fomalhaut	W.	78 56 27	80 29 26	82 2 50	83 36 37
	α Pegasi	W.	56 42 30	58 17 54	59 53 50	61 30 18
	Aldebaran	E.	22 28 31	20 59 28	19 31 58	18 6 29
	Pollux	E.	62 58 34	61 17 56	59 36 57	57 55 38
	Jupiter	E.	66 18 56	64 37 16	62 55 15	61 12 52
	Saturn	E.	97 58 6	96 17 6	94 35 43	92 53 59
8	Fomalhaut	W.	91 30 53	93 6 42	94 42 46	96 19 6
	α Pegasi	W.	69 39 50	71 19 4	72 58 42	74 38 43
	Pollux	E.	49 24 10	47 40 56	45 57 26	44 13 39
	Jupiter	E.	52 35 42	50 51 15	49 6 28	47 21 22
	Saturn	E.	84 20 4	82 36 16	80 52 8	79 7 41
	Regulus	E.	86 12 26	84 28 37	82 44 28	81 0 1
9	α Pegasi	W.	83 4 6	84 46 7	86 28 23	88 10 56
	α Arietis	W.	40 2 26	41 47 47	43 33 26	45 19 24
	Pollux	E.	35 31 7	33 46 2	32 0 47	30 15 27

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
9	Jupiter	E.	45° 35′ 58″	43° 50′ 16″	42° 4′ 15″	40° 17′ 58″
	Saturn	E.	77 22 56	75 37 52	73 52 30	72 6 52
	Regulus	E.	79 15 14	77 30 10	75 44 47	73 59 8
10	α Pegasi	W.	89 53 42	91 36 41	93 19 53	95 3 15
	α Arietis	W.	47 5 39	48 52 10	50 38 56	52 25 56
	Aldebaran	W.	17 38 11	19 7 19	20 39 25	22 13 53
	Jupiter	E.	31 22 39	29 34 53	27 46 55	25 58 46
	Saturn	E.	63 14 41	61 27 32	59 40 11	57 52 37
	Regulus	E.	65 6 55	63 19 46	61 32 24	59 44 50
11	α Arietis	W.	61 23 56	63 12 1	65 0 15	66 48 36
	Aldebaran	W.	30 29 37	32 11 52	33 54 49	35 38 23
	Saturn	E.	48 52 18	47 3 49	45 15 14	43 26 33
	Regulus	E.	50 44 25	48 55 55	47 7 19	45 18 36
	Mars	E.	111 23 55	109 40 40	107 57 18	106 13 49
12	α Arietis	W.	75 51 35	77 40 21	79 29 7	81 17 54
	Aldebaran	W.	44 22 42	46 8 30	47 54 30	49 40 42
	Saturn	E.	34 22 17	32 33 22	30 44 28	28 55 36
	Regulus	E.	36 14 4	34 25 4	32 36 4	30 47 4
	Spica	E.	90 16 53	88 27 50	86 38 46	84 49 43
	Mars	E.	97 35 10	95 51 18	94 7 24	92 23 30
13	α Arietis	W.	90 21 33	92 10 8	93 58 39	95 47 6
	Aldebaran	W.	58 33 18	60 20 0	62 6 43	63 53 24
	Spica	E.	75 44 45	73 55 54	72 7 8	70 18 27
	Mars	E.	83 44 19	82 0 38	80 17 2	78 33 30
	Sun	E.	134 49 46	133 8 56	131 28 8	129 47 24
14	Aldebaran	W.	72 46 13	74 32 33	76 18 47	78 4 54
	Pollux	W.	30 10 41	31 57 24	33 44 8	35 30 50
	Jupiter	W.	27 0 17	28 49 2	30 37 40	32 26 10
	Spica	E.	61 16 37	59 28 37	57 40 46	55 53 5
	Mars	E.	69 57 35	68 14 47	66 32 9	64 49 40
	Sun	E.	121 24 55	119 44 44	118 4 40	116 24 44
15	Aldebaran	W.	86 53 26	88 38 40	90 23 44	92 8 37
	Pollux	W.	44 23 13	46 9 22	47 55 24	49 41 16
	Jupiter	W.	41 26 31	43 14 7	45 1 32	46 48 46
	Spica	E.	46 57 5	45 10 25	43 23 57	41 37 41
	Mars	E.	56 20 0	54 38 39	52 57 31	51 16 37
	Sun	E.	108 7 18	106 28 18	104 49 28	103 10 49
16	Pollux	W.	58 28 18	60 13 12	61 57 54	63 42 26
	Jupiter	W.	55 42 14	57 28 22	59 14 18	61 0 2
	Saturn	W.	23 26 30	25 11 28	26 56 18	28 40 59
	Regulus	W.	21 26 34	23 11 35	24 56 27	26 41 10
	Mars	E.	42 55 39	41 16 14	39 37 6	37 58 16
	Sun	E.	95 0 17	93 22 45	91 45 24	90 8 16
17	Pollux	W.	72 22 17	74 5 41	75 48 53	77 31 54
	Jupiter	W.	69 45 46	71 30 19	73 14 40	74 58 49
	Saturn	W.	37 22 1	39 5 42	40 49 13	42 32 32

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
9	Jupiter	E.	38 31 25	36 44 35	34 57 30	33 10 11
	Saturn	E.	70 20 56	68 34 45	66 48 18	65 1 37
	Regulus	E.	72 13 12	70 27 0	68 40 33	66 53 51
10	α Pegasi	W.	96 46 47	98 30 28	100 14 15	101 58 8
	α Arietis	W.	54 13 9	56 0 34	57 48 11	59 35 59
	Aldebaran	W.	23 50 18	25 28 20	27 7 42	28 48 11
	Jupiter	E.	24 10 26	22 21 58	20 33 21	18 44 38
	Saturn	E.	56 4 53	54 16 58	52 28 53	50 40 39
	Regulus	E.	57 57 4	56 9 8	54 21 3	52 32 48
11	α Arietis	W.	68 37 3	70 25 35	72 14 11	74 2 52
	Aldebaran	W.	37 22 28	39 6 59	40 51 54	42 37 9
	Saturn	E.	41 37 48	39 48 58	38 0 6	36 11 12
	Regulus	E.	43 29 48	41 40 56	39 52 1	38 3 4
	Mars	E.	104 30 14	102 46 34	101 2 49	99 19 1
12	α Arietis	W.	83 6 42	84 55 28	86 44 12	88 32 54
	Aldebaran	W.	51 27 2	53 13 29	55 0 1	56 46 38
	Saturn	E.	27 6 47	25 18 3	23 29 25	21 40 55
	Regulus	E.	28 58 7	27 9 12	25 20 22	23 31 36
	Spica	E.	83 0 39	81 11 37	79 22 37	77 33 39
	Mars	E.	90 39 36	88 55 43	87 11 52	85 28 4
13	α Arietis	W.	97 35 26	99 23 41	101 11 48	102 59 49
	Aldebaran	W.	65 40 4	67 26 42	69 13 17	70 59 48
	Spica	E.	68 29 52	66 41 22	64 53 0	63 4 45
	Mars	E.	76 50 5	75 6 46	73 23 35	71 40 30
	Sun	E.	128 6 43	126 26 8	124 45 37	123 5 13
14	Aldebaran	W.	79 50 54	81 36 45	83 22 28	85 8 2
	Pollux	W.	37 17 29	39 4 3	40 50 33	42 36 56
	Jupiter	W.	34 14 32	36 2 46	37 50 51	39 38 46
	Spica	E.	54 5 32	52 18 9	50 30 57	48 43 55
	Mars	E.	63 7 22	61 25 14	59 43 18	58 1 33
	Sun	E.	114 44 57	113 5 18	111 25 49	109 46 29
15	Aldebaran	W.	93 53 19	95 37 49	97 22 8	99 6 15
	Pollux	W.	51 27 0	53 12 35	54 57 59	56 43 14
	Jupiter	W.	48 35 50	50 22 43	52 9 25	53 55 55
	Spica	E.	39 51 38	38 5 46	36 20 8	34 34 43
	Mars	E.	49 35 56	47 55 29	46 15 17	44 35 20
	Sun	E.	101 32 20	99 54 2	98 15 56	96 38 1
16	Pollux	W.	65 26 47	67 10 57	68 54 55	70 38 42
	Jupiter	W.	62 45 34	64 30 55	66 16 4	68 1 1
	Saturn	W.	30 25 31	32 9 53	33 54 6	35 38 9
	Regulus	W.	28 25 43	30 10 5	31 54 17	33 38 17
	Mars	E.	36 19 44	34 41 32	33 3 41	31 26 11
	Sun	E.	88 31 19	86 54 34	85 18 1	83 41 40
17	Pollux	W.	79 14 42	80 57 19	82 39 44	84 21 58
	Jupiter	W.	76 42 46	78 26 32	80 10 6	81 53 28
	Saturn	W.	44 15 40	45 58 37	47 41 23	49 23 58

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
17	Regulus	W.	35 22 7	37 5 46	38 49 13	40 32 28
	Mars	E.	29 49 6	28 12 26	26 36 14	25 0 33
	Sun	E.	82 5 31	80 29 34	78 53 50	77 18 17
18	Pollux	W.	86 3 59	87 45 49	89 27 28	91 8 54
	Jupiter	W.	83 36 38	85 19 36	87 2 22	88 44 57
	Saturn	W.	51 6 21	52 48 33	54 30 33	56 12 22
	Regulus	W.	49 5 52	50 47 59	52 29 53	54 11 36
	Sun	E.	69 23 35	67 49 15	66 15 6	64 41 10
19	Pollux	W.	99 33 10	101 13 26	102 53 31	104 33 24
	Jupiter	W.	97 14 58	98 56 24	100 37 39	102 18 42
	Saturn	W.	64 38 39	66 19 21	67 59 52	69 40 11
	Regulus	W.	62 37 19	64 17 53	65 58 16	67 38 28
	Sun	E.	56 54 27	55 21 42	53 49 9	52 16 48
20	Jupiter	W.	110 41 9	112 21 6	114 0 50	115 40 24
	Saturn	W.	77 59 1	79 38 14	81 17 16	82 56 7
	Regulus	W.	75 56 38	77 35 42	79 14 35	80 53 18
	Spica	W.	22 0 58	23 39 19	25 17 35	26 55 44
	Sun	E.	44 38 2	43 6 53	41 35 56	40 5 11
21	Saturn	W.	91 7 37	92 45 22	94 22 55	96 0 18
	Regulus	W.	89 4 2	90 41 37	92 19 2	93 56 15
	Spica	W.	35 4 30	36 41 48	38 18 57	39 55 56
	Sun	E.	32 34 38	31 5 11	29 35 57	28 6 58
26	Sun	W.	25 22 26	26 44 35	28 6 38	29 28 36
	α Pegasi	E.	54 53 23	53 28 19	52 3 35	50 39 12
	α Arietis	E.	96 12 17	94 42 8	93 12 7	91 42 14
27	Sun	W.	36 17 9	37 38 36	38 59 58	40 21 15
	α Pegasi	E.	43 43 19	42 21 30	41 0 13	39 39 29
	α Arietis	E.	84 14 46	82 45 38	81 16 37	79 47 41
28	Sun	W.	47 6 40	48 27 35	49 48 27	51 9 17
	α Pegasi	E.	33 6 3	31 49 53	30 34 47	29 20 51
	α Arietis	E.	72 24 23	70 55 57	69 27 34	67 59 15
	Aldebaran	E.	104 29 24	103 2 6	101 34 50	100 7 36
29	Sun	W.	57 53 7	59 13 53	60 34 39	61 55 27
	α Aquilæ	W.	43 14 11	44 14 51	45 16 45	46 19 48
	α Arietis	E.	60 38 12	59 10 3	57 41 54	56 13 45
	Aldebaran	E.	92 51 41	91 24 31	89 57 21	88 30 9
30	Sun	W.	68 40 4	70 1 11	71 22 23	72 43 41
	α Aquilæ	W.	51 49 54	52 58 30	54 7 52	55 17 56
	α Arietis	E.	48 52 42	47 24 23	45 56 0	44 27 34
	Aldebaran	E.	81 13 41	79 46 14	78 18 44	76 51 9
31	Sun	W.	79 31 55	80 53 59	82 16 12	83 38 36
	α Aquilæ	W.	61 17 54	62 31 38	63 45 53	65 0 38
	α Arietis	E.	37 4 16	35 35 21	34 6 20	32 37 14
	Aldebaran	E.	69 31 52	68 3 41	66 35 23	65 6 57
	Jupiter	E.	112 43 4	111 12 19	109 41 25	108 10 21

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
17	Regulus	W.	42 15 32	43 58 25	45 41 6	47 23 35
	Mars	E.	23 25 27	21 51 1	20 17 21	18 44 36
	Sun	E.	75 42 56	74 7 48	72 32 52	70 58 7
18	Pollux	W.	92 50 9	94 31 12	96 12 3	97 52 42
	Jupiter	W.	90 27 20	92 9 32	93 51 32	95 33 21
	Saturn	W.	57 54 0	59 35 27	61 16 42	62 57 46
	Regulus	W.	55 53 8	57 34 28	59 15 37	60 56 34
	Sun	E.	63 7 26	61 33 53	60 0 33	58 27 24
19	Pollux	W.	106 13 5	107 52 34	109 31 52	111 10 58
	Jupiter	W.	103 59 34	105 40 15	107 20 44	109 1 2
	Saturn	W.	71 20 19	73 0 16	74 40 2	76 19 37
	Regulus	W.	69 18 28	70 58 17	72 37 55	74 17 22
	Sun	E.	50 44 39	49 12 41	47 40 56	46 9 23
20	Jupiter	W.	117 19 47	118 58 59	120 37 59	122 16 49
	Saturn	W.	84 34 47	86 13 16	87 51 34	89 29 41
	Regulus	W.	82 31 49	84 10 9	85 48 17	87 26 15
	Spica	W.	28 33 45	30 11 39	31 49 25	33 27 2
	Sun	E.	38 34 39	37 4 19	35 34 12	34 4 18
21	Saturn	W.	97 37 30	99 14 31	100 51 21	102 27 59
	Regulus	W.	95 33 17	97 10 8	98 46 48	100 23 17
	Spica	W.	41 32 45	43 9 24	44 45 53	46 22 11
	Sun	E.	26 38 14	25 9 46	23 41 34	22 13 39
26	Sun	W.	30 50 29	32 12 17	33 34 0	34 55 37
	α Pegasi	E.	49 15 12	47 51 35	46 28 23	45 5 37
	α Arietis	E.	90 12 29	88 42 52	87 13 23	85 44 1
27	Sun	W.	41 42 28	43 3 37	44 24 41	45 45 42
	α Pegasi	E.	38 19 21	36 59 53	35 41 8	34 23 9
	α Arietis	E.	78 18 51	76 50 7	75 21 27	73 52 53
28	Sun	W.	52 30 5	53 50 51	55 11 37	56 32 22
	α Pegasi	E.	28 8 15	26 57 8	25 47 42	24 40 11
	α Arietis	E.	66 30 58	65 2 44	63 34 32	62 6 21
	Aldebaran	E.	98 40 23	97 13 12	95 46 1	94 18 51
29	Sun	W.	63 16 17	64 37 9	65 58 4	67 19 2
	α Aquilæ	W.	47 23 55	48 29 3	49 35 7	50 42 5
	α Arietis	E.	54 45 36	53 17 25	51 49 13	50 20 59
	Aldebaran	E.	87 2 56	85 35 41	84 8 24	82 41 4
30	Sun	W.	74 5 5	75 26 36	76 48 14	78 10 0
	α Aquilæ	W.	56 28 41	57 40 6	58 52 7	60 4 43
	α Arietis	E.	42 59 4	41 30 29	40 1 50	38 33 5
	Aldebaran	E.	75 23 29	73 55 44	72 27 53	70 59 55
31	Sun	W.	85 1 11	86 23 57	87 46 56	89 10 7
	α Aquilæ	W.	66 15 53	67 31 36	68 47 47	70 4 25
	α Arietis	E.	31 8 3	29 38 46	28 9 25	26 39 59
	Aldebaran	E.	63 38 23	62 9 41	60 40 50	59 11 50
	Jupiter	E.	106 39 7	105 7 41	103 36 2	102 4 9

JANUARY, 1859.							
MEAN TIME.							
Day of the Month.	GEOCENTRIC.						
	Apparent Declination. Noon.				Meridian Passage.		
		°	′	″	h.	m.	
1	S.	9	44	18	3	54·1	
2		9	26	25	3	53·0	
3		9	8	28	3	51·9	
4		8	50	27	3	50·8	
5		8	32	23	3	49·6	
6		8	14	14	3	48·5	
7		7	56	2	3	47·4	
8		7	37	46	3	46·2	
9		7	19	28	3	45·1	
10		7	1	6	3	43·9	
11		6	42	42	3	42·8	
12		6	24	15	3	41·6	
13		6	5	46	3	40·4	
14		5	47	15	3	39·3	
15		5	28	42	3	38·1	
16		5	10	7	3	36·9	
17		4	51	31	3	35·7	
18		4	32	53	3	34·5	
19		4	14	14	3	33·4	
20		3	55	34	3	32·2	
21		3	36	53	3	31·0	
22		3	18	11	3	29·8	
23		2	59	29	3	28·6	
24		2	40	46	3	27·4	
25		2	22	3	3	26·2	
26		2	3	20	3	24·9	
27		1	44	36	3	23·7	
28		1	25	53	3	22·5	
29		1	7	10	3	21·3	
30		0	48	28	3	20·1	
31		0	29	47	3	18·9	
32	S.	0	11	6	3	17·7	

FEBRUARY, 1859.						
MEAN TIME.						
Day of the Month.	GEOCENTRIC.					
	Apparent Declination. Noon.				Meridian Passage.	
		°	′	″	h.	m.
1	S.	0	11	6	3	17·7
2	N.	0	7	33	3	16·4
3		0	26	11	3	15·2
4		0	44	48	3	14·0
5		1	3	24	3	12·7
6		1	21	58	3	11·5
7		1	40	30	3	10·3
8		1	58	59	3	9·0
9		2	17	27	3	7·8
10		2	35	52	3	6·6
11		2	54	15	3	5·3
12		3	12	35	3	4·1
13		3	30	52	3	2·9
14		3	49	6	3	1·7
15		4	7	16	3	0·4
16		4	25	24	2	59·2
17		4	43	27	2	57·9
18		5	1	28	2	56·7
19		5	19	24	2	55·5
20		5	37	17	2	54·2
21		5	55	5	2	53·0
22		6	12	50	2	51·8
23		6	30	30	2	50·5
24		6	48	6	2	49·3
25		7	5	37	2	48·1
26		7	23	3	2	46·8
27		7	40	25	2	45·6
28		7	57	42	2	44·4
29	N.	8	14	53	2	43·1

MARCH, 1859.

MEAN TIME.

Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N. 8	14	53	2	43·1
2	8	31	59	2	41·9
3	8	49	0	2	40·7
4	9	5	56	2	39·5
5	9	22	45	2	38·3
6	9	39	29	2	37·1
7	9	56	7	2	35·8
8	10	12	39	2	34·6
9	10	29	4	2	33·4
10	10	45	23	2	32·2
11	11	1	36	2	31·0
12	11	17	41	2	29·8
13	11	33	40	2	28·6
14	11	49	32	2	27·4
15	12	5	17	2	26·2
16	12	20	55	2	25·0
17	12	36	25	2	23·8
18	12	51	48	2	22·6
19	13	7	4	2	21·4
20	13	22	11	2	20·3
21	13	37	11	2	19·1
22	13	52	4	2	17·9
23	14	6	48	2	16·7
24	14	21	24	2	15·5
25	14	35	51	2	14·4
26	14	50	11	2	13·2
27	15	4	22	2	12·0
28	15	18	25	2	10·9
29	15	32	18	2	9·7
30	15	46	4	2	8·6
31	15	59	40	2	7·4
32	N.16	13	7	2	6·3

APRIL, 1859.

MEAN TIME.

Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N.16	13	7	2	6·3
2	16	26	25	2	5·1
3	16	39	34	2	4·0
4	16	52	34	2	2·9
5	17	5	24	2	1·8
6	17	18	4	2	0·6
7	17	30	35	1	59·5
8	17	42	56	1	58·4
9	17	55	8	1	57·3
10	18	7	9	1	56·2
11	18	19	0	1	55·0
12	18	30	41	1	53·9
13	18	42	12	1	52·8
14	18	53	32	1	51·7
15	19	4	42	1	50·7
16	19	15	41	1	49·6
17	19	26	30	1	48·5
18	19	37	8	1	47·4
19	19	47	35	1	46·3
20	19	57	52	1	45·2
21	20	7	58	1	44·1
22	20	17	52	1	43·1
23	20	27	36	1	42·0
24	20	37	8	1	40·9
25	20	46	29	1	39·9
26	20	55	39	1	38·8
27	21	4	38	1	37·8
28	21	13	25	1	36·7
29	21	22	1	1	35·6
30	21	30	25	1	34·6
31	N.21	38	38	1	33·5

MAY, 1859.

MEAN TIME.

Day of the Month.	GEOCENTRIC. Apparent Declination. Noon. °	′	″	Meridian Passage. h.	m.
1	N.21	38	38	1	33·5
2	21	46	38	1	32·5
3	21	54	28	1	31·5
4	22	2	5	1	30·4
5	22	9	30	1	29·4
6	22	16	44	1	28·4
7	22	23	45	1	27·3
8	22	30	35	1	26·3
9	22	37	12	1	25·3
10	22	43	38	1	24·2
11	22	49	51	1	23·2
12	22	55	52	1	22·2
13	23	1	40	1	21·2
14	23	7	17	1	20·2
15	23	12	41	1	19·2
16	23	17	53	1	18·1
17	23	22	52	1	17·1
18	23	27	40	1	16·1
19	23	32	14	1	15·1
20	23	36	37	1	14·1
21	23	40	47	1	13·0
22	23	44	45	1	12·0
23	23	48	30	1	11·0
24	23	52	2	1	10·0
25	23	55	23	1	9·0
26	23	58	30	1	8·0
27	24	1	26	1	7·0
28	24	4	9	1	6·0
29	24	6	39	1	4·9
30	24	8	57	1	3·9
31	24	11	2	1	2·9
32	N.24	12	55	1	1·9

JUNE, 1859.

MEAN TIME.

Day of the Month.	GEOCENTRIC. Apparent Declination. Noon. °	′	″	Meridian Passage. h.	m.
1	N.24	12	55	1	1·9
2	24	14	36	1	0·9
3	24	16	4	0	59·9
4	24	17	19	0	58·8
5	24	18	22	0	57·8
6	24	19	13	0	56·8
7	24	19	51	0	55·8
8	24	20	18	0	54·8
9	24	20	31	0	53·7
10	24	20	33	0	52·7
11	24	20	22	0	51·7
12	24	19	59	0	50·6
13	24	19	24	0	49·6
14	24	18	37	0	48·5
15	24	17	37	0	47·5
16	24	16	26	0	46·4
17	24	15	2	0	45·4
18	24	13	27	0	44·3
19	24	11	40	0	43·3
20	24	9	41	0	42·2
21	24	7	30	0	41·2
22	24	5	7	0	40·1
23	24	2	32	0	39·0
24	23	59	46	0	37·9
25	23	56	48	0	36·8
26	23	53	39	0	35·8
27	23	50	18	0	34·7
28	23	46	46	0	33·6
29	23	43	3	0	32·5
30	23	39	8	0	31·4
31	N.23	35	2	0	30·3

JULY, 1859.

MEAN TIME.

Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N. 23	35	2	0	30·3
2	23	30	45	0	29·2
3	23	26	16	0	28·1
4	23	21	37	0	27·0
5	23	16	47	0	25·8
6	23	11	46	0	24·7
7	23	6	35	0	23·6
8	23	1	13	0	22·4
9	22	55	40	0	21·3
10	22	49	57	0	20·1
11	22	44	3	0	19·0
12	22	37	59	0	17·8
13	22	31	45	0	16·6
14	22	25	21	0	15·4
15	22	18	47	0	14·3
16	22	12	2	0	13·1
17	22	5	8	0	11·9
18	21	58	4	0	10·7
19	21	50	50	0	9·5
20	21	43	27	0	8·3
21	21	35	54	0	7·1
22	21	28	12	0	5·8
23	21	20	20	0	4·6
24	21	12	20	0	3·4
25	21	4	9	0	2·1
26	20	55	50	{ 0 / 23	0·9 / 59·6 }
27	20	47	22	23	58·4
28	20	38	45	23	57·1
29	20	29	59	23	55·8
30	20	21	5	23	54·6
31	20	12	2	23	53·3
32	N. 20	2	51	23	52·0

AUGUST, 1859.

MEAN TIME.

Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N. 20	2	51	23	52·0
2	19	53	31	23	50·7
3	19	44	3	23	49·4
4	19	34	27	23	48·1
5	19	24	43	23	46·8
6	19	14	51	23	45·4
7	19	4	51	23	44·1
8	18	54	43	23	42·8
9	18	44	28	23	41·5
10	18	34	6	23	40·1
11	18	23	36	23	39·8
12	18	12	58	23	37·4
13	18	2	14	23	36·0
14	17	51	22	23	34·6
15	17	40	23	23	33·3
16	17	29	18	23	31·9
17	17	18	5	23	30·5
18	17	6	46	23	29·1
19	16	55	20	23	27·7
20	16	43	47	23	26·3
21	16	32	8	23	24·9
22	16	20	23	23	23·5
23	16	8	31	23	22·0
24	15	56	34	23	20·6
25	15	44	30	23	19·2
26	15	32	20	23	17·7
27	15	20	4	23	16·3
28	15	7	43	23	14·9
29	14	55	16	23	13·4
30	14	42	44	23	11·9
31	14	30	6	23	10·5
32	N. 14	17	23	23	9·0

SEPTEMBER, 1859.

MEAN TIME.

Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N.14	17	23	23	9·0
2	14	4	35	23	7·5
3	13	51	42	23	6·0
4	13	38	44	23	4·5
5	13	25	41	23	3·1
6	13	12	33	23	1·6
7	12	59	20	23	0·1
8	12	46	3	22	58·6
9	12	32	42	22	57·0
10	12	19	16	22	55·5
11	12	5	46	22	54·0
12	11	52	11	22	52·5
13	11	38	33	22	50·9
14	11	24	50	22	49·4
15	11	11	3	22	47·9
16	10	57	13	22	46·4
17	10	43	19	22	44·8
18	10	29	21	22	43·3
19	10	15	19	22	41·7
20	10	1	14	22	40·1
21	9	47	6	22	38·6
22	9	32	54	22	37·0
23	9	18	39	22	35·5
24	9	4	21	22	33·9
25	8	50	0	22	32·3
26	8	35	36	22	30·8
27	8	21	10	22	29·2
28	8	6	41	22	27·6
29	7	52	9	22	26·0
30	7	37	35	22	24·4
31	N. 7	22	58	22	22·8

OCTOBER, 1859.

MEAN TIME.

Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N. 7	22	58	22	22·8
2	7	8	19	22	21·2
3	6	53	38	22	19·6
4	6	38	55	22	18·0
5	6	24	11	22	16·4
6	6	9	24	22	14·8
7	5	54	35	22	13·2
8	5	39	45	22	11·6
9	5	24	53	22	10·0
10	5	9	59	22	8·4
11	4	55	4	22	6·8
12	4	40	7	22	5·2
13	4	25	10	22	3·5
14	4	10	11	22	1·9
15	3	55	10	22	0·3
16	3	49	9	21	58·7
17	3	25	7	21	57·0
18	3	10	4	21	55·4
19	2	55	0	21	53·8
20	2	39	56	21	52·2
21	2	24	50	21	50·6
22	2	9	45	21	48·9
23	1	54	39	21	47·3
24	1	39	33	21	45·7
25	1	24	26	21	44·0
26	1	9	20	21	42·4
27	0	54	13	21	40·8
28	0	39	7	21	39·1
29	0	24	1	21	37·5
30	N. 0	8	55	21	35·9
31	S. 0	6	9	21	34·2
32	S. 0	21	14	21	32·6

NOVEMBER, 1859.								DECEMBER, 1859.							
MEAN TIME.								MEAN TIME.							
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.				Meridian Passage.			Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.				Meridian Passage.		
		°	′	″	h.	m.				°	′	″	h.	m.	
1	S.	0	21	14	21	32·6		1	S.	7	42	33	20	43·9	
2		0	36	18	21	31·0		2		7	56	38	20	42·3	
3		0	51	21	21	29·3		3		8	10	40	20	40·8	
4		1	6	24	21	27·7		4		8	24	39	20	39·2	
5		1	21	26	21	26·1		5		8	38	33	20	37·6	
6		1	36	27	21	24·4		6		8	52	25	20	36·0	
7		1	51	27	21	22·8		7		9	6	12	20	34·4	
8		2	6	25	21	21·2		8		9	19	56	20	32·8	
9		2	21	23	21	19·5		9		9	33	35	20	31·2	
10		2	36	19	21	17·9		10		9	47	11	20	29·7	
11		2	51	15	21	16·3		11		10	8	43	20	28·1	
12		3	6	8	21	14·6		12		10	14	11	20	26·5	
13		3	21	0	21	13·0		13		10	27	34	20	24·9	
14		3	35	51	21	11·4		14		10	40	54	20	23·4	
15		3	50	40	21	9·8		15		10	54	8	20	21·8	
16		4	5	27	21	8·2		16		11	7	19	20	20·2	
17		4	20	12	21	6·5		17		11	20	24	20	18·7	
18		4	34	56	21	4·9		18		11	33	26	20	17·1	
19		4	49	37	21	3·3		19		11	46	22	20	15·5	
20		5	4	16	21	1·7		20		11	59	13	20	14·0	
21		5	18	53	21	0·0		21		12	12	0	20	12·5	
22		5	33	27	20	58·4		22		12	24	41	20	10·9	
23		5	47	59	20	56·8		23		12	37	17	20	9·4	
24		6	2	28	20	55·2		24		12	49	48	20	7·8	
25		6	16	55	20	53·6		25		13	2	13	20	6·3	
26		6	31	19	20	52·0		26		13	14	34	20	4·8	
27		6	45	40	20	50·4		27		13	26	48	20	3·2	
28		6	59	58	20	48·8		28		13	38	57	20	1·7	
29		7	14	13	20	47·2		29		13	51	0	20	0·2	
30		7	28	25	20	45·6		30		14	2	58	19	58·6	
								31		14	14	49	19	57·1	
31	S.	7	42	33	20	43·9									
								32	S.	14	26	35	19	55·6	

JANUARY, 1859.

MEAN TIME.

Day of the Month.	GEOCENTRIC. Apparent Declination. Noon. °	′	″	Meridian Passage. h.	m.
1	N. 21	53	37	10	4·6
2	21	53	2	10	0·2
3	21	52	28	9	55·8
4	21	51	54	9	51·5
5	21	51	22	9	47·1
6	21	50	50	9	42·8
7	21	50	20	9	38·4
8	21	49	51	9	34·1
9	21	49	22	9	29·8
10	21	48	55	9	25·5
11	21	48	29	9	21·2
12	21	48	4	9	17·0
13	21	47	41	9	12·7
14	21	47	19	9	8·5
15	21	46	58	9	4·3
16	21	46	38	9	0·0
17	21	46	20	8	55·8
18	21	46	3	8	51·6
19	21	45	48	8	47·5
20	21	45	34	8	43·3
21	21	45	22	8	39·1
22	21	45	11	8	35·0
23	21	45	1	8	30·9
24	21	44	53	8	26·8
25	21	44	47	8	22·7
26	21	44	42	8	18·6
27	21	44	39	8	14·5
28	21	44	38	8	10·5
29	21	44	38	8	6·4
30	21	44	40	8	2·4
31	21	44	43	7	58·4
32	N. 21	44	48	7	54·4

FEBRUARY, 1859.

MEAN TIME.

Day of the Month.	GEOCENTRIC. Apparent Declination. Noon. °	′	″	Meridian Passage. h.	m.
1	N. 21	44	48	7	54·4
2	21	44	55	7	50·4
3	21	45	3	7	46·5
4	21	45	13	7	42·5
5	21	45	24	7	38·6
6	21	45	38	7	34·7
7	21	45	52	7	30·8
8	21	46	9	7	26·9
9	21	46	27	7	23·0
10	21	46	46	7	19·2
11	21	47	8	7	15·3
12	21	47	30	7	11·5
13	21	47	55	7	7·6
14	21	48	20	7	3·8
15	21	48	48	7	0·0
16	21	49	17	6	56·2
17	21	49	47	6	52·4
18	21	50	19	6	48·7
19	21	50	52	6	44·9
20	21	51	27	6	41·2
21	21	52	3	6	37·5
22	21	52	40	6	33·8
23	21	53	19	6	30·1
24	21	53	59	6	26·5
25	21	54	40	6	22·8
26	21	55	23	6	19·2
27	21	56	7	6	15·6
28	21	56	52	6	11·9
29	N. 21	57	38	6	8·3

MARCH, 1859.							APRIL, 1859.						
MEAN TIME.							MEAN TIME.						
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			GEOCENTRIC. Meridian Passage.			Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			GEOCENTRIC. Meridian Passage.		
	°	′	″	h.	m.			°	′	″	h.	m.	
1	N.21	57	38	6	8·3		1	N.22	28	14	4	22·0	
2	21	58	25	6	4·7		2	22	29	20	4	18·8	
3	21	59	14	6	1·1		3	22	30	26	4	15·5	
4	22	0	4	5	57·6		4	22	31	32	4	12·3	
5	22	0	54	5	54·0		5	22	32	38	4	9·0	
6	22	1	46	5	50·5		6	22	33	44	4	5·8	
7	22	2	39	5	46·9		7	22	34	49	4	2·5	
8	22	3	33	5	43·4		8	22	35	55	3	59·3	
9	22	4	27	5	39·9		9	22	37	0	3	56·1	
10	22	5	23	5	36·4		10	22	38	5	3	52·9	
11	22	6	19	5	32·9		11	22	39	10	3	49·7	
12	22	7	16	5	29·4		12	22	40	15	3	46·5	
13	22	8	14	5	26·0		13	22	41	19	3	43·3	
14	22	9	13	5	22·5		14	22	42	23	3	40·1	
15	22	10	12	5	19·1		15	22	43	26	3	37·0	
16	22	11	12	5	15·6		16	22	44	29	3	33·8	
17	22	12	13	5	12·2		17	22	45	32	3	30·7	
18	22	13	14	5	8·8		18	22	46	34	3	27·5	
19	22	14	16	5	5·4		19	22	47	36	3	24·4	
20	22	15	18	5	2·0		20	22	48	37	3	21·2	
21	22	16	21	4	58·6		21	22	49	38	3	18·1	
22	22	17	24	4	55·2		22	22	50	38	3	15·0	
23	22	18	28	4	51·9		23	22	51	38	3	11·9	
24	22	19	32	4	48·5		24	22	52	36	3	8·7	
25	22	20	36	4	45·2		25	22	53	35	3	5·6	
26	22	21	41	4	41·9		26	22	54	32	3	2·5	
27	22	22	46	4	38·5		27	22	55	29	2	59·4	
28	22	23	51	4	35·2		28	22	56	25	2	56·3	
29	22	24	57	4	31·9		29	22	57	20	2	53·3	
30	22	26	2	4	28·6		30	22	58	14	2	50·2	
31	22	27	8	4	25·3		31	N.22	59	8	2	47·1	
32	N.22	28	14	4	22·0								

MAY, 1859.						JUNE, 1859.					
MEAN TIME.						MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.		Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.		°	′	″	h.	m.
1	N.22	59	8	2	47·1	1	N.23	18	10	1	13·8
2	23	0	1	2	44·0	2	23	18	27	1	10·8
3	23	0	53	2	41·0	3	23	18	43	1	7·8
4	23	1	44	2	37·9	4	23	18	57	1	4·9
5	23	2	34	2	34·9	5	23	19	10	1	1·9
6	23	3	23	2	31·8	6	23	19	22	0	58·9
7	23	4	11	2	28·8	7	23	19	32	0	56·0
8	23	4	58	2	25·7	8	23	19	41	0	53·0
9	23	5	45	2	22·7	9	23	19	49	0	50·1
10	23	6	30	2	19·7	10	23	19	55	0	47·1
11	23	7	14	2	16·6	11	23	19	59	0	44·2
12	23	7	57	2	13·6	12	23	20	2	0	41·2
13	23	8	39	2	10·6	13	23	20	4	0	38·3
14	23	9	20	2	7·5	14	23	20	5	0	35·3
15	23	9	59	2	4·5	15	23	20	4	0	32·4
16	23	10	38	2	1·5	16	23	20	1	0	29·5
17	23	11	16	1	58·5	17	23	19	57	0	26·5
18	23	11	52	1	55·5	18	23	19	52	0	23·6
19	23	12	27	1	52·5	19	23	19	45	0	20·6
20	23	13	1	1	49·5	20	23	19	37	0	17·7
21	23	13	34	1	46·5	21	23	19	28	0	14·7
22	23	14	5	1	43·5	22	23	19	17	0	11·8
23	23	14	35	1	40·5	23	23	19	4	0	8·8
24	23	15	4	1	37·5	24	23	18	50	0	5·9
25	23	15	32	1	34·6	25	23	18	35	0	2·9
26	23	15	59	1	31·6	26	23	18	18	{0 {23	0·0} 57·0}
27	23	16	24	1	28·6	27	23	18	0	23	54·1
28	23	16	48	1	25·6	28	23	17	41	23	51·2
29	23	17	10	1	22·7	29	23	17	20	23	48·2
30	23	17	32	1	19·7	30	23	16	57	23	45·3
31	23	17	52	1	16·7	31	N.23	16	33	23	42·3
32	N.23	18	10	1	13·8						

JULY, 1859.						AUGUST, 1859.					
MEAN TIME.						MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.		Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.		°	′	″	h.	m.
1	N. 23	16	33	23	42·3	1	N. 22	53	36	22	10·1
2	23	16	8	23	39·4	2	22	52	34	22	7·1
3	23	15	42	23	36·4	3	22	51	30	22	4·1
4	23	15	14	23	33·5	4	22	50	25	22	1·1
5	23	14	44	23	30·5	5	22	49	20	21	58·0
6	23	14	14	23	27·6	6	22	48	14	21	55·0
7	23	13	42	23	24·6	7	22	47	7	21	52·0
8	23	13	8	23	21·6	8	22	45	59	21	48·9
9	23	12	34	23	18·7	9	22	44	50	21	45·9
10	23	11	58	23	15·7	10	22	43	41	21	42·8
11	23	11	20	23	12·8	11	22	42	30	21	39·8
12	23	10	42	23	9·8	12	22	41	19	21	36·7
13	23	10	2	23	6·9	13	22	40	8	21	33·7
14	23	9	21	23	3·9	14	22	38	55	21	30·6
15	23	8	38	23	0·9	15	22	37	42	21	27·5
16	23	7	55	22	57·9	16	22	36	28	21	24·5
17	23	7	10	22	55·0	17	22	35	14	21	21·4
18	23	6	23	22	52·0	18	22	33	59	21	18·3
19	23	5	36	22	49·0	19	22	32	44	21	15·2
20	23	4	48	22	46·0	20	22	31	28	21	12·1
21	23	3	58	22	43·1	21	22	30	12	21	9·0
22	23	3	7	22	40·1	22	22	28	55	21	5·9
23	23	2	15	22	37·1	23	22	27	38	21	2·8
24	23	1	21	22	34·1	24	22	26	20	20	59·7
25	23	0	27	22	31·1	25	22	25	2	20	56·6
26	22	59	31	22	28·1	26	22	23	44	20	53·4
27	22	58	35	22	25·1	27	22	22	25	20	50·3
28	22	57	37	22	22·1	28	22	21	6	20	47·2
29	22	56	38	22	19·1	29	22	19	47	20	44·0
30	22	55	39	22	16·1	30	22	18	28	20	40·9
31	22	54	38	22	13·1	31	22	17	8	20	37·7
32	N. 22	53	36	22	10·1	32	N. 22	15	49	20	34·5

SEPTEMBER, 1859.						OCTOBER, 1859.					
MEAN TIME.						MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			GEOCENTRIC. Meridian Passage.		Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			GEOCENTRIC. Meridian Passage.	
	°	′	″	h.	m.		°	′	″	h.	m.
1	N.22	15	49	20	34·5	1	N.21	38	8	18	56·0
2	22	14	29	20	31·4	2	21	37	3	18	52·5
3	22	13	10	20	28·2	3	21	35	59	18	49·1
4	22	11	50	20	25·0	4	21	34	57	18	45·7
5	22	10	30	20	21·8	5	21	33	55	18	42·2
6	22	9	11	20	18·6	6	21	32	55	18	38·7
7	22	7	51	20	15·4	7	21	31	56	18	35·2
8	22	6	32	20	12·2	8	21	30	59	18	31·8
9	22	5	13	20	8·9	9	21	30	3	18	28·3
10	22	3	54	20	5·7	10	21	29	8	18	24·7
11	22	2	35	20	2·5	11	21	28	14	18	21·2
12	22	1	16	19	59·2	12	21	27	22	18	17·7
13	21	59	58	19	56·0	13	21	26	32	18	14·1
14	21	58	40	19	52·7	14	21	25	43	18	10·6
15	21	57	23	19	49·4	15	21	24	56	18	7·0
16	21	56	6	19	46·2	16	21	24	10	18	3·5
17	21	54	49	19	42·9	17	21	23	25	17	59·9
18	21	53	33	19	39·6	18	21	22	43	17	56·3
19	21	52	17	19	36·3	19	21	22	2	17	52·6
20	21	51	2	19	33·0	20	21	21	23	17	49·0
21	21	49	48	19	29·7	21	21	20	46	17	45·4
22	21	48	34	19	26·3	22	21	20	10	17	41·7
23	21	47	21	19	23·0	23	21	19	36	17	38·0
24	21	46	9	19	19·6	24	21	19	5	17	34·4
25	21	44	58	19	16·3	25	21	18	35	17	30·7
26	21	43	47	19	12·9	26	21	18	7	17	27·0
27	21	42	37	19	9·5	27	21	17	41	17	23·3
28	21	41	28	19	6·2	28	21	17	17	17	19·5
29	21	40	20	19	2·8	29	21	16	55	17	15·8
30	21	39	13	18	59·4	30	21	16	35	17	12·0
						31	21	16	17	17	8·3
31	N.21	38	8	18	56·0	32	N.21	16	1	17	4·5

NOVEMBER, 1859.						
MEAN TIME.						
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N. 21	16	1	17	4·5
2	21	15	48	17	0·7
3	21	15	36	16	56·9
4	21	15	27	16	53·0
5	21	15	19	16	49·2
6	21	15	14	16	45·4
7	21	15	11	16	41·5
8	21	15	10	16	37·6
9	21	15	12	16	33·7
10	21	15	15	16	29·8
11	21	15	21	16	25·9
12	21	15	29	16	22·0
13	21	15	39	16	18·1
14	21	15	52	16	14·1
15	21	16	6	16	10·1
16	21	16	23	16	6·1
17	21	16	42	16	2·1
18	21	17	3	15	58·1
19	21	17	27	15	54·1
20	21	17	52	15	50·0
21	21	18	20	15	46·0
22	21	18	50	15	41·9
23	21	19	22	15	37·8
24	21	19	57	15	33·7
25	21	20	33	15	29·6
26	21	21	12	15	25·5
27	21	21	52	15	21·3
28	21	22	35	15	17·2
29	21	23	20	15	13·0
30	21	24	7	15	8·8
31	N. 21	24	55	15	4·7

DECEMBER, 1859.					
MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N. 21	24	55	15	4·7
2	21	25	46	15	0·4
3	21	26	38	14	56·2
4	21	27	32	14	52·0
5	21	28	28	14	47·8
6	21	29	26	14	43·5
7	21	30	25	14	39·2
8	21	31	26	14	34·9
9	21	32	29	14	30·7
10	21	33	33	14	26·3
11	21	34	38	14	22·0
12	21	35	45	14	17·7
13	21	36	54	14	13·4
14	21	38	3	14	9·0
15	21	39	14	14	4·7
16	21	40	27	14	0·3
17	21	41	40	13	55·9
18	21	42	55	13	51·5
19	21	44	10	13	47·2
20	21	45	27	13	42·7
21	21	46	44	13	38·3
22	21	48	2	13	33·9
23	21	49	21	13	29·5
24	21	50	41	13	25·1
25	21	52	1	13	20·6
26	21	53	22	13	16·2
27	21	54	44	13	11·7
28	21	56	5	13	7·2
29	21	57	27	13	2·8
30	21	58	50	12	58·3
31	22	0	12	12	53·8
32	N. 22	1	35	12	49·3

JANUARY, 1859.							FEBRUARY, 1859.						
MEAN TIME.							MEAN TIME.						
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.			Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.		
	°	′	″	h.	m.			°	′	″	h.	m.	
1	N.18	11	9	14	9·8		1	N.18	53	8	11	58·3	
2	18	12	22	14	5·6		2	18	54	31	11	54·1	
3	18	13	36	14	1·4		3	18	55	53	11	49·8	
4	18	14	50	13	57·2		4	18	57	15	11	45·5	
5	18	16	6	13	53·0		5	18	58	36	11	41·3	
6	18	17	23	13	48·8		6	18	59	57	11	37·0	
7	18	18	40	13	44·6		7	19	1	17	11	32·8	
8	18	19	58	13	40·3		8	19	2	37	11	28·5	
9	18	21	17	13	36·1		9	19	3	55	11	24·3	
10	18	22	36	13	31·9		10	19	5	13	11	20·0	
11	18	23	57	13	27·6		11	19	6	31	11	15·8	
12	18	25	18	13	23·4		12	19	7	47	11	11·5	
13	18	26	39	13	19·2		13	19	9	3	11	7·3	
14	18	28	1	13	14·9		14	19	10	18	11	3·0	
15	18	29	23	13	10·7		15	19	11	31	10	58·8	
16	18	30	46	13	6·4		16	19	12	44	10	54·6	
17	18	32	9	13	2·2		17	19	13	56	10	50·3	
18	18	33	32	12	57·9		18	19	15	7	10	46·1	
19	18	34	56	12	53·7		19	19	16	17	10	41·9	
20	18	36	20	12	49·4		20	19	17	26	10	37·7	
21	18	37	44	12	45·2		21	19	18	34	10	33·5	
22	18	39	8	12	40·9		22	19	19	40	10	29·3	
23	18	40	33	12	36·7		23	19	20	46	10	25·1	
24	18	41	57	12	32·4		24	19	21	50	10	20·9	
25	18	43	22	12	28·2		25	19	22	53	10	16·7	
26	18	44	46	12	23·9		26	19	23	55	10	12·5	
27	18	46	10	12	19·6		27	19	24	56	10	8·3	
							28	19	25	55	10	4·1	
28	18	47	34	12	15·4								
29	18	48	58	12	11·1		29	N.19	26	53	9	59·9	
30	18	50	22	12	6·8								
31	18	51	45	12	2·6								
32	N.18	53	8	11	58·3								

MARCH, 1859.			APRIL, 1859.		
MEAN TIME.			MEAN TIME.		
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.	GEOCENTRIC. Meridian Passage.
	° ′ ″	h. m.		° ′ ″	h. m.
1	N.19 26 53	9 59·9	1	N.19 44 29	7 53·5
2	19 27 50	9 55·7	2	19 44 37	7 49·5
3	19 28 45	9 51·6	3	19 44 44	7 45·6
4	19 29 39	9 47·4	4	19 44 49	7 41·6
5	19 30 31	9 43·2	5	19 44 53	7 37·7
6	19 31 23	9 39·1	6	19 44 55	7 33·7
7	19 32 12	9 34·9	7	19 44 55	7 29·8
8	19 33 0	9 30·8	8	19 44 53	7 25·9
9	19 33 47	9 26·7	9	19 44 50	7 22·0
10	19 34 32	9 22·5	10	19 44 45	7 18·1
11	19 35 16	9 18·4	11	19 44 39	7 14·2
12	19 35 58	9 14·3	12	19 44 31	7 10·3
13	19 36 39	9 10·2	13	19 44 21	7 6·4
14	19 37 18	9 6·1	14	19 44 10	7 2·5
15	19 37 55	9 2·0	15	19 43 57	6 58·6
16	19 38 31	8 57·9	16	19 43 43	6 54·8
17	19 39 6	8 53·9	17	19 43 27	6 50·9
18	19 39 38	8 49·8	18	19 43 9	6 47·1
19	19 40 10	8 45·7	19	19 42 50	6 43·2
20	19 40 39	8 41·7	20	19 42 29	6 39·4
21	19 41 7	8 37·6	21	19 42 7	6 35·6
22	19 41 34	8 33·6	22	19 41 43	6 31·8
23	19 41 59	8 29·5	23	19 41 17	6 27·9
24	19 42 22	8 25·5	24	19 40 50	6 24·1
25	19 42 43	8 21·5	25	19 40 21	6 20·3
26	19 43 3	8 17·4	26	19 39 51	6 16·5
27	19 43 22	8 13·4	27	19 39 19	6 12·8
28	19 43 38	8 9·4	28	19 38 46	6 9·0
29	19 43 54	8 5·4	29	19 38 11	6 5·2
30	19 44 7	8 1·5	30	19 37 35	6 1·4
31	19 44 19	7 57·5	31	N.19 36 57	5 57·7
32	N.19 44 29	7 53·5			

MAY, 1859.					
MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N.19	36	57	5	57·7
2	19	36	17	5	53·9
3	19	35	36	5	50·2
4	19	34	54	5	46·4
5	19	34	10	5	42·7
6	19	33	24	5	39·0
7	19	32	37	5	35·3
8	19	31	49	5	31·6
9	19	30	59	5	27·9
10	19	30	8	5	24·2
11	19	29	15	5	20·5
12	19	28	21	5	16·8
13	19	27	25	5	13·1
14	19	26	28	5	9·5
15	19	25	30	5	5·8
16	19	24	30	5	2·1
17	19	23	29	4	58·5
18	19	22	27	4	54·8
19	19	21	23	4	51·2
20	19	20	18	4	47·5
21	19	19	11	4	43·9
22	19	18	4	4	40·3
23	19	16	55	4	36·7
24	19	15	44	4	33·0
25	19	14	32	4	29·4
26	19	13	19	4	25·8
27	19	12	5	4	22·2
28	19	10	49	4	18·6
29	19	9	32	4	15·0
30	19	8	14	4	11·5
31	19	6	55	4	7·9
32	N.19	5	34	4	4·3

JUNE, 1859.					
MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N.19	5	34	4	4·3
2	19	4	12	4	0·7
3	19	2	49	3	57·1
4	19	1	25	3	53·6
5	19	0	0	3	50·0
6	18	58	33	3	46·5
7	18	57	5	3	42·9
8	18	55	36	3	39·4
9	18	54	6	3	35·8
10	18	52	35	3	32·3
11	18	51	2	3	28·8
12	18	49	29	3	25·2
13	18	47	54	3	21·7
14	18	46	19	3	18·2
15	18	44	42	3	14·7
16	18	43	5	3	11·2
17	18	41	26	3	7·6
18	18	39	46	3	4·1
19	18	38	5	3	0·6
20	18	36	24	2	57·1
21	18	34	41	2	53·6
22	18	32	57	2	50·1
23	18	31	12	2	46·6
24	18	29	27	2	43·2
25	18	27	40	2	39·7
26	18	25	53	2	36·2
27	18	24	4	2	32·7
28	18	22	15	2	29·2
29	18	20	24	2	25·8
30	18	18	33	2	22·3
31	N.18	16	41	2	18·8

JULY, 1859.						AUGUST, 1859.					
MEAN TIME.						MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.		Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.		°	′	″	h.	m.
1	N.18	16	41	2	18·8	1	N.17	13	1	0	32·3
2	18	14	48	2	15·4	2	17	10	50	0	28·8
3	18	12	54	2	11·9	3	17	8	38	0	25·4
4	18	11	0	2	8·4	4	17	6	26	0	22·0
5	18	9	4	2	5·0	5	17	4	13	0	18·6
6	18	7	8	2	1·5	6	17	2	1	0	15·2
7	18	5	11	1	58·1	7	16	59	48	0	11·7
8	18	3	13	1	54·6	8	16	57	34	0	8·3
9	18	1	15	1	51·2	9	16	55	21	0	4·9
10	17	59	16	1	47·7	10	16	53	7	0 23	1·5 58·0
11	17	57	16	1	44·3	11	16	50	54	23	54·6
12	17	55	15	1	40·9	12	16	48	40	23	51·2
13	17	53	14	1	37·4	13	16	46	26	23	47·8
14	17	51	12	1	34·0	14	16	44	12	23	44·4
15	17	49	10	1	30·5	15	16	41	57	23	40·9
16	17	47	7	1	27·1	16	16	39	43	23	37·5
17	17	45	3	1	23·7	17	16	37	29	23	34·1
18	17	42	58	1	20·2	18	16	35	14	23	30·7
19	17	40	53	1	16·8	19	16	33	0	23	27·2
20	17	38	48	1	13·4	20	16	30	46	23	23·8
21	17	36	42	1	9·9	21	16	28	31	23	20·4
22	17	34	35	1	6·5	22	16	26	17	23	17·0
23	17	32	28	1	3·1	23	16	24	3	23	13·5
24	17	30	20	0	59·7	24	16	21	49	23	10·1
25	17	28	12	0	56·2	25	16	19	34	23	6·6
26	17	26	3	0	52·8	26	16	17	21	23	3·2
27	17	23	54	0	49·4	27	16	15	7	22	59·8
28	17	21	44	0	46·0	28	16	12	53	22	56·3
29	17	19	34	0	42·5	29	16	10	40	22	52·9
30	17	17	23	0	39·1	30	16	8	27	22	49·5
31	17	15	13	0	35·7	31	16	6	14	22	46·0
32	N.17	13	1	0	32·3	32	N.16	4	1	22	42·6

SEPTEMBER, 1859.						OCTOBER, 1859.					
MEAN TIME.						MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.		Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.		°	′	″	h.	m.
1	N.16	4	1	22	42·6	1	N.15	2	2	20	58·1
2	16	1	49	22	39·1	2	15	0	11	20	54·5
3	15	59	37	22	35·7	3	14	58	21	20	51·0
4	15	57	26	22	32·2	4	14	56	32	20	47·4
5	15	55	15	22	28·8	5	14	54	44	20	43·9
6	15	53	4	22	25·3	6	14	52	58	20	40·4
7	15	50	54	22	21·9	7	14	51	12	20	36·8
8	15	48	44	22	18·4	8	14	49	28	20	33·2
9	15	46	35	22	14·9	9	14	47	46	20	29·7
10	15	44	26	22	11·5	10	14	46	4	20	26·1
11	15	42	18	22	8·0	11	14	44	24	20	22·5
12	15	40	10	22	4·6	12	14	42	45	20	19·0
13	15	38	3	22	1·1	13	14	41	7	20	15·4
14	15	35	57	21	57·6	14	14	39	31	20	11·8
15	15	33	51	21	54·1	15	14	37	56	20	8·2
16	15	31	46	21	50·6	16	14	36	23	20	4·6
17	15	29	41	21	47·2	17	14	34	51	20	1·0
18	15	27	37	21	43·7	18	14	33	21	19	57·4
19	15	25	34	21	40·2	19	14	31	52	19	53·8
20	15	23	31	21	36·7	20	14	30	25	19	50·1
21	15	21	30	21	33·2	21	14	28	59	19	46·5
22	15	19	29	21	29·7	22	14	27	35	19	42·9
23	15	17	29	21	26·2	23	14	26	13	19	39·3
24	15	15	30	21	22·7	24	14	24	52	19	35·6
25	15	13	31	21	19·2	25	14	23	33	19	32·0
26	15	11	34	21	15·7	26	14	22	16	19	28·3
27	15	9	38	21	12·2	27	14	21	0	19	24·7
28	15	7	42	21	8·6	28	14	19	46	19	21·0
29	15	5	48	21	5·1	29	14	18	34	19	17·3
30	15	3	55	21	1·6	30	14	17	24	19	13·7
						31	14	16	16	19	10·0
31	N.15	2	2	20	58·1	32	N.14	15	9	19	6·3

NOVEMBER, 1859.

MEAN TIME.

Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N. 14	15	9	19	6·3
2	14	14	5	19	2·6
3	14	13	2	18	58·9
4	14	12	1	18	55·2
5	14	11	2	18	51·5
6	14	10	5	18	47·8
7	14	9	10	18	44·1
8	14	8	17	18	40·4
9	14	7	27	18	36·6
10	14	6	38	18	32·9
11	14	5	51	18	29·1
12	14	5	6	18	25·4
13	14	4	23	18	21·6
14	14	3	43	18	17·8
15	14	3	4	18	14·1
16	14	2	28	18	10·3
17	14	1	54	18	6·5
18	14	1	22	18	2·7
19	14	0	52	17	58·9
20	14	0	24	17	55·1
21	13	59	59	17	51·3
22	13	59	36	17	47·5
23	13	59	15	17	43·7
24	13	58	56	17	39·8
25	13	58	40	17	36·0
26	13	58	26	17	32·1
27	13	58	14	17	28·3
28	13	58	5	17	24·4
29	13	57	58	17	20·5
30	13	57	53	17	16·6
31	N. 13	57	50	17	12·8

DECEMBER, 1859.

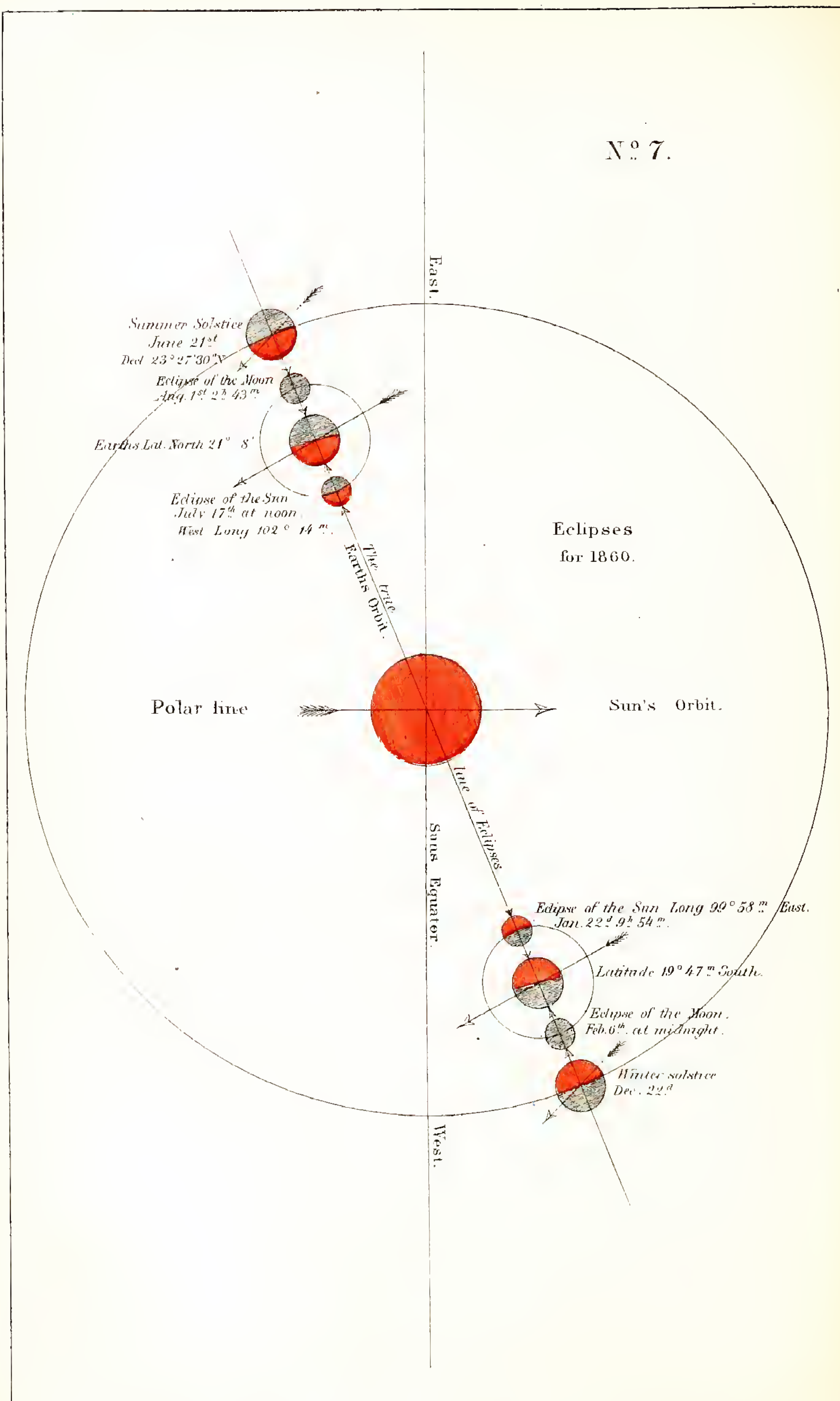
MEAN TIME.

Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N. 13	57	50	17	12·8
2	13	57	50	17	8·9
3	13	57	52	17	5·0
4	13	57	56	17	1·1
5	13	58	2	16	57·1
6	13	58	11	16	53·2
7	13	58	22	16	49·3
8	13	58	36	16	45·4
9	13	58	52	16	41·4
10	13	59	10	16	37·5
11	13	59	30	16	33·5
12	13	59	52	16	29·6
13	14	0	17	16	25·6
14	14	0	44	16	21·6
15	14	1	13	16	17·6
16	14	1	45	16	13·6
17	14	2	19	16	9·6
18	14	2	55	16	5·6
19	14	3	33	16	1·6
20	14	4	13	15	57·6
21	14	4	55	15	53·5
22	14	5	40	15	49·5
23	14	6	27	15	45·5
24	14	7	15	15	41·4
25	14	8	6	15	37·4
26	14	8	59	15	33·3
27	14	9	54	15	29·2
28	14	10	51	15	25·2
29	14	11	50	15	21·1
30	14	12	51	15	17·0
31	14	13	53	15	12·9
32	N. 14	14	58	15	8·8

NAUTICAL ALMANAC

FOR THE YEAR

1860.



Lith of J Bien, 60 Fulton St N Y

ECLIPSES OF THE SUN AND MOON.

In the year 1860 there will be two Eclipses of the Sun and two of the Moon.

I.—*An Annular Eclipse of the SUN, January* 22, 1860, *invisible at Greenwich.*

	Mean Time at Greenwich.
Begins on the Earth generally January $22^d\ 9^h\ 54^{m}\cdot3$, in Longitude 99° 58′ E. of Greenwich, and Latitude . .	49° 20′ S.
Central Eclipse begins generally January $22^d\ 11^h\ 35^{m}\cdot0$, in Longitude 30° 29′ E. of Greenwich, and Latitude . .	69° 9′ S.
Central Eclipse at Noon January $22^d\ 11^h\ 51^{m}\cdot2$, in Longitude 5° 10′ E. of Greenwich, and Latitude	88° 59′ S.
Central Eclipse ends generally January $22^d\ 13^h\ 19^{m}\cdot2$, in Longitude 88° 11′ W. of Greenwich, and Latitude . .	41° 59′ S.
Ends on the Earth generally January $22^d\ 14^h\ 59^{m}\cdot9$, in Longitude 126° 30′ W. of Greenwich, and Latitude . .	15° 8′ S.

II.—*A Partial Eclipse of the MOON, February* 6, 1860, *invisible at Greenwich.*

		d.	h.	m.	
First contact with the Penumbra	February	6	12	0·1	Mean Time at Greenwich.
First contact with the Shadow	"	6	13	1·8	
Middle of the Eclipse	"	6	14	28·7	
Last contact with the Shadow	"	6	15	55·6	
Last contact with the Penumbra	"	6	16	57·3	

At these times respectively the Moon will be in the Zenith of the places whose positions are—

Longitude					Latitude		
1°	55′	E.	of Greenwich.		15°	44′	N.
12	55	W.			15	29	
33	50				15	8	
54	44				14	46	
69	35	W.			14	30	N.

Magnitude of the Eclipse (Moon's diameter = 1) 0·809.
The first contact with the Shadow occurs at 79° from the Northernmost point of the Moon's limb toward the East.
The last contact at 32° toward the West; in each case, for *direct* image.

III.—*A Total Eclipse of the SUN, July* 18, 1860, *visible* (*as a partial one*) *at Greenwich.*

	Mean Time at Greenwich.
Begins on the Earth generally July $17^d\ 23^h\ 53^{m}\cdot8$, in Longitude 102° 14′ W. of Greenwich, and Latitude . .	34° 43′ N.
Central Eclipse begins generally July $18^d\ 0^h\ 57^{m}\cdot3$, in Longitude 125° 47′ W. of Greenwich, and Latitude . .	45° 42′ N.
Central Eclipse at Noon July $18^d\ 2^h\ 8^{m}\cdot1$, in Longitude 30° 33′ W. of Greenwich, and Latitude	56° 8′ N.
Central Eclipse ends generally July $18^d\ 3^h\ 53^{m}\cdot2$, in Longitude 39° 25′ E. of Greenwich, and Latitude . .	15° 56′ N.
Ends on the Earth generally July $18^d\ 4^h\ 56^{m}\cdot6$, in Longitude 18° 56′ E. of Greenwich, and Latitude . .	4° 16′ N.

IV.—*A Partial Eclipse of the MOON, August* 1, 1860, *invisible at Greenwich.*

		d.	h.	m.	
First contact with the Penumbra	August	1	2	43·2	Mean Time at Greenwich.
First contact with the Shadow	"	1	4	8·4	
Middle of the Eclipse	"	1	5	24·5	
Last contact with the Shadow	"	1	6	40·6	
Last contact with the Penumbra	"	1	8	5·8	

Magnitude of the Eclipse (Moon's diameter = 1) 0·443.

ELEMENTS OF THE ECLIPSES OF THE SUN.

1860.	January 22.	July 18.
	d. h. m. s.	d. h. m. s.
Greenwich Mean Time of ☌ in R. A.	22 11 51 13	18 2 8 7
☉ and ☽'s Right Ascension	20 18 6	7 52 20
	° ′ ″	° ′ ″
☽'s Declination	S. 20 31 39	N. 21 31 11
☉'s Declination	S. 19 40 24	N. 20 57 0

PHASES OF THE MOON FOR 1860.

JANUARY.

	d.	h.	m.
Full Moon	8	3	23·4
Last Quarter . . .	14	18	58·7
New Moon	22	12	16·7
First Quarter . . .	30	17	10·9

FEBRUARY.

	d.	h.	m.
Full Moon	6	14	35·4
Last Quarter . . .	13	6	51·3
New Moon	21	7	38·6
First Quarter . . .	29	7	55·3

MARCH.

	d.	h.	m.
Full Moon	7	0	44·2
Last Quarter . . .	13	21	8·7
New Moon	22	1	55·5
First Quarter . . .	29	18	52·8

APRIL.

	d.	h.	m.
Full Moon	5	10	0·0
Last Quarter . . .	12	13	34·5
New Moon	20	17	44·8
First Quarter . . .	28	2	36·2

MAY.

	d.	h.	m.
Full Moon	4	19	1·8
Last Quarter . . .	12	7	16·4
New Moon	20	6	46·0
First Quarter . . .	27	8	4·7

JUNE.

	d.	h.	m.
Full Moon	3	4	45·9
Last Quarter . . .	11	1	4·3
New Moon	18	17	23·7
First Quarter . . .	25	12	36·1

JULY.

	d.	h.	m.
Full Moon	2	16	7·0
Last Quarter . . .	10	17	58·1
New Moon	18	2	20·3
First Quarter . . .	24	18	19·7

AUGUST.

	d.	h.	m.
Full Moon	1	5	33·6
Last Quarter . . .	9	9	23·4
New Moon	16	10	20·2
First Quarter . . .	23	0	49·8
Full Moon	30	20	57·4

SEPTEMBER.

	d.	h.	m.
Last Quarter . . .	7	23	7·1
New Moon	14	18	9·5
First Quarter . . .	21	11	24·9
Full Moon	29	13	39·8

OCTOBER.

	d.	h.	m.
Last Quarter . . .	7	11	4·8
New Moon	14	2	37·6
First Quarter . . .	21	2	10·6
Full Moon	29	6	49·9

NOVEMBER.

	d.	h.	m.
Last Quarter . . .	5	21	17·5
New Moon	12	12	36·4
First Quarter . . .	19	20	52·7
Full Moon	27	23	37·9

DECEMBER.

	d.	h.	m.
Last Quarter . . .	5	6	0·8
New Moon	12	0	48·5
First Quarter . . .	19	18	9·8
Full Moon	27	15	17·4

1860. AT GREENWICH APPARENT NOON. 1860.

JANUARY, 1860.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, *to be added to Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Sun.	1	S.23 3 12	11	3 36	1
Mon.	2	22 58 12	13	4 5	1
Tues.	3	22 52 45	14	4 33	1
Wed.	4	22 46 51	15	5 0	1
Thur.	5	22 40 30	16	5 27	1
Fri.	6	22 33 41	17	5 54	1
Sat.	7	22 26 26	18	6 20	1
Sun.	8	22 18 45	19	6 46	1
Mon.	9	22 10 37	20	7 12	1
Tues.	10	22 2 3	21	7 36	1
Wed.	11	21 53 4	23	8 0	0
Thur.	12	21 43 38	24	8 24	0
Fri.	13	21 33 48	25	8 47	0
Sat.	14	21 23 32	26	9 9	0
Sun.	15	21 12 52	27	9 31	0
Mon.	16	21 1 47	28	9 52	0
Tues.	17	20 50 18	29	10 13	0
Wed.	18	20 38 25	30	10 33	0
Thur.	19	20 26 8	31	10 52	0
Fri.	20	20 13 28	32	11 10	0
Sat.	21	20 0 26	33	11 28	0
Sun.	22	19 47 1	33	11 44	0
Mon.	23	19 33 14	34	12 0	0
Tues.	24	19 19 5	35	12 16	0
Wed.	25	19 4 35	36	12 30	0
Thur.	26	18 49 44	37	12 44	0
Fri.	27	18 34 33	38	12 57	0
Sat.	28	18 19 1	39	13 9	0
Sun.	29	18 3 10	40	13 20	0
Mon.	30	17 46 59	40	13 30	0
Tues.	31	17 30 30	41	13 40	0
Wed.	32	S.17 13 42	42	13 48	0

FEBRUARY, 1860.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, *to be added to Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Wed.	1	S.17 13 42	42	13 48	0
Thur.	2	16 56 36	43	13 56	0
Fri.	3	16 39 12	43	14 3	0
Sat.	4	16 21 32	44	14 9	0
Sun.	5	16 3 34	45	14 15	0
Mon.	6	15 45 19	45	14 19	0
Tues.	7	15 26 49	46	14 23	0
Wed.	8	15 8 3	47	14 26	0
Thur.	9	14 49 1	47	14 28	0
Fri.	10	14 29 45	48	14 29	0
Sat.	11	14 10 14	49	14 30	0
Sun.	12	13 50 29	49	14 30	0
Mon.	13	13 30 30	50	14 29	0
Tues.	14	13 10 18	50	14 27	0
Wed.	15	12 49 53	51	14 25	0
Thur.	16	12 29 15	51	14 21	0
Fri.	17	12 8 25	52	14 18	0
Sat.	18	11 47 24	52	14 13	0
Sun.	19	11 26 11	53	14 8	0
Mon.	20	11 4 48	53	14 2	0
Tues.	21	10 43 14	54	13 55	0
Wed.	22	10 21 31	54	13 48	0
Thur.	23	9 59 38	54	13 40	0
Fri.	24	9 37 36	55	13 32	0
Sat.	25	9 15 25	55	13 23	0
Sun.	26	8 53 6	55	13 13	0
Mon.	27	8 30 39	56	13 3	0
Tues.	28	8 8 5	56	12 52	0
Wed.	29	7 45 24	56	12 41	0
Thur.	30	S. 7 22 37	57	12 29	0

1860. AT GREENWICH APPARENT NOON. 1860.

MARCH, 1860.						APRIL, 1860.					
Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, *to be added to Apparent Time.*	Diff. for 1 hr.	Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, *to be added to* / *subt. from Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.			° ′ ″	″	m. s.	s.
Thur.	1	S. 7 22 37	57	12 29	0	*Sun.*	1	N. 4 44 37	57	3 49	0
Fri.	2	6 59 43	57	12 16	0	Mon.	2	5 7 39	57	3 31	0
Sat.	3	6 36 44	57	12 3	0	Tues.	3	5 30 36	57	3 13	0
Sun.	4	6 13 39	57	11 50	0	Wed.	4	5 53 27	57	2 55	0
Mon.	5	5 50 29	58	11 36	0	Thur.	5	6 16 12	56	2 37	0
Tues.	6	5 27 14	58	11 22	0	Fri.	6	6 38 51	56	2 19	0
Wed.	7	5 3 55	58	11 7	0	Sat.	7	7 1 23	56	2 2	0
Thur.	8	4 40 33	58	10 52	0	*Sun.*	8	7 23 48	55	1 45	0
Fri.	9	4 17 6	58	10 36	0	Mon.	9	7 46 5	55	1 28	0
Sat.	10	3 53 36	58	10 21	0	Tues.	10	8 8 15	55	1 12	0
Sun.	11	3 30 3	58	10 4	0	Wed.	11	8 30 17	54	0 55	0
Mon.	12	3 6 28	59	9 48	0	Thur.	12	8 52 11	54	0 40	0
Tues.	13	2 42 51	59	9 31	0	Fri.	13	9 13 55	54	0 24	0
Wed.	14	2 19 11	59	9 14	0	Sat.	14	9 35 30	53	0 9	0
Thur.	15	1 55 31	59	8 57	0	*Sun.*	15	9 56 57	53	0 5	0
Fri.	16	1 31 49	59	8 40	0	Mon.	16	10 18 13	52	0 20	0
Sat.	17	1 8 6	59	8 22	0	Tues.	17	10 39 20	52	0 34	0
Sun.	18	0 44 23	59	8 5	0	Wed.	18	11 0 15	52	0 48	0
Mon.	19	S. 0 20 41	59	7 47	0	Thur.	19	11 21 0	51	1 1	0
Tues.	20	N. 0 3 1	59	7 29	0	Fri.	20	11 41 34	51	1 14	0
Wed.	21	0 26 43	59	7 11	0	Sat.	21	12 1 56	50	1 26	0
Thur.	22	0 50 23	59	6 52	0	*Sun.*	22	12 22 7	50	1 38	0
Fri.	23	1 14 2	59	6 34	0	Mon.	23	12 42 5	49	1 50	0
Sat.	24	1 37 39	58	6 16	0	Tues.	24	13 1 51	49	2 1	0
Sun.	25	2 1 13	58	5 57	0	Wed.	25	13 21 24	48	2 12	0
Mon.	26	2 24 45	58	5 39	0	Thur.	26	13 40 43	48	2 22	0
Tues.	27	2 48 13	58	5 20	0	Fri.	27	13 59 49	47	2 31	0
Wed.	28	3 11 38	58	5 2	0	Sat.	28	14 18 41	46	2 41	0
Thur.	29	3 34 59	58	4 44	0	*Sun.*	29	14 37 19	46	2 49	0
Fri.	30	3 58 16	58	4 25	0	Mon.	30	14 55 42	45	2 57	0
Sat.	31	4 21 29	57	4 7	0						
Sun.	32	N. 4 44 37	57	3 49	0	Tues.	31	N.15 13 51	45	3 5	0

1860. AT GREENWICH APPARENT NOON. 1860.

MAY, 1860.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, *to be subt. from Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Tues.	1	N.15 13 51	45	3 5	0
Wed.	2	15 31 44	44	3 12	0
Thur.	3	15 49 23	43	3 19	0
Fri.	4	16 6 45	43	3 25	0
Sat.	5	16 23 52	42	3 30	0
Sun.	6	16 40 42	41	3 35	0
Mon.	7	16 57 16	41	3 40	0
Tues.	8	17 13 33	40	3 43	0
Wed.	9	17 29 32	39	3 47	0
Thur.	10	17 45 15	38	3 49	0
Fri.	11	18 0 39	38	3 51	0
Sat.	12	18 15 46	37	3 53	0
Sun.	13	18 30 34	36	3 54	0
Mon.	14	18 45 4	35	3 54	0
Tues.	15	18 59 15	35	3 54	0
Wed.	16	19 13 7	34	3 53	0
Thur.	17	19 26 39	33	3 51	0
Fri.	18	19 39 51	32	3 49	0
Sat.	19	19 52 44	31	3 46	0
Sun.	20	20 5 16	30	3 43	0
Mon.	21	20 17 27	30	3 39	0
Tues.	22	20 29 18	29	3 35	0
Wed.	23	20 40 48	28	3 30	0
Thur.	24	20 51 56	27	3 25	0
Fri.	25	21 2 43	26	3 19	0
Sat.	26	21 13 8	25	3 13	0
Sun.	27	21 23 11	24	3 6	0
Mon.	28	21 32 51	23	2 59	0
Tues.	29	21 42 10	22	2 52	0
Wed.	30	21 51 6	21	2 44	0
Thur.	31	21 59 39	20	2 35	0
Fri.	32	N.22 7 49	19	2 26	0

JUNE, 1860.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, *to be subt. from* / *added to Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Fri.	1	N.22 7 49	19	2 26	0
Sat.	2	22 15 36	18	2 17	0
Sun.	3	22 23 0	18	2 7	0
Mon.	4	22 30 1	17	1 57	0
Tues.	5	22 36 38	16	1 47	0
Wed.	6	22 42 51	15	1 37	0
Thur.	7	22 48 40	14	1 26	0
Fri.	8	22 54 5	13	1 14	0
Sat.	9	22 59 7	12	1 3	0
Sun.	10	23 3 44	11	0 51	0
Mon.	11	23 7 57	10	0 39	0
Tues.	12	23 11 45	9	0 27	0
Wed.	13	23 15 9	7	0 14	0
Thur.	14	23 18 8	6	0 2	0
Fri.	15	23 20 43	5	0 10	0
Sat.	16	23 22 53	4	0 23	0
Sun.	17	23 24 38	3	0 36	0
Mon.	18	23 25 58	2	0 49	0
Tues.	19	23 26 54	1	1 2	0
Wed.	20	23 27 24	0	1 15	0
Thur.	21	23 27 30	0	1 28	0
Fri.	22	23 27 11	1	1 41	0
Sat.	23	23 26 27	2	1 54	0
Sun.	24	23 25 18	3	2 7	0
Mon.	25	23 23 45	4	2 20	0
Tues.	26	23 21 47	5	2 32	0
Wed.	27	23 19 24	6	2 45	0
Thur.	28	23 16 37	7	2 57	0
Fri.	29	23 13 25	8	3 9	0
Sat.	30	23 9 49	9	3 21	0
Sun.	31	N.23 5 49	10	3 32	0

1860. AT GREENWICH APPARENT NOON. 1860.

JULY, 1860.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, to be added to Apparent Time.	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Sun.	1	N.23 5 49	10	3 32	0
Mon.	2	23 1 25	11	3 44	0
Tues.	3	22 56 36	12	3 55	0
Wed.	4	22 51 24	13	4 5	0
Thur.	5	22 45 47	14	4 16	0
Fri.	6	22 39 47	15	4 26	0
Sat.	7	22 33 24	16	4 35	0
Sun.	8	22 26 37	17	4 45	0
Mon.	9	22 19 26	18	4 54	0
Tues.	10	22 11 53	19	5 2	0
Wed.	11	22 3 56	20	5 10	0
Thur.	12	21 55 37	21	5 18	0
Fri.	13	21 46 55	22	5 25	0
Sat.	14	21 37 51	23	5 32	0
Sun.	15	21 28 24	24	5 38	0
Mon.	16	21 18 35	24	5 44	0
Tues.	17	21 8 25	25	5 50	0
Wed.	18	20 57 53	26	5 54	0
Thur.	19	20 47 0	27	5 59	0
Fri.	20	20 35 46	28	6 2	0
Sat.	21	20 24 11	29	6 5	0
Sun.	22	20 12 15	30	6 8	0
Mon.	23	20 0 0	31	6 10	0
Tues.	24	19 47 24	31	6 11	0
Wed.	25	19 34 29	32	6 12	0
Thur.	26	19 21 14	33	6 12	0
Fri.	27	19 7 40	34	6 12	0
Sat.	28	18 53 47	35	6 11	0
Sun.	29	18 39 36	35	6 9	0
Mon.	30	18 25 6	36	6 7	0
Tues.	31	18 10 19	37	6 4	0
Wed.	32	N.17 55 13	38	6 0	0

AUGUST, 1860.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, to be added to / subt. from Apparent Time.	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Wed.	1	N.17 55 13	38	6 0	0
Thur.	2	17 39 50	38	5 56	0
Fri.	3	17 24 10	39	5 51	0
Sat.	4	17 8 13	40	5 46	0
Sun.	5	16 51 59	40	5 40	0
Mon.	6	16 35 28	41	5 34	0
Tues.	7	16 18 42	42	5 26	0
Wed.	8	16 1 39	42	5 19	0
Thur.	9	15 44 21	43	5 11	0
Fri.	10	15 26 47	44	5 2	0
Sat.	11	15 8 59	44	4 53	0
Sun.	12	14 50 56	45	4 43	0
Mon.	13	14 32 39	46	4 32	0
Tues.	14	14 14 8	46	4 21	0
Wed.	15	13 55 23	47	4 10	0
Thur.	16	13 36 25	47	3 58	0
Fri.	17	13 17 14	48	3 45	0
Sat.	18	12 57 50	48	3 32	0
Sun.	19	12 38 13	49	3 19	0
Mon.	20	12 18 25	49	3 5	0
Tues.	21	11 58 26	50	2 51	0
Wed.	22	11 38 15	50	2 36	0
Thur.	23	11 17 52	51	2 20	0
Fri.	24	10 57 20	51	2 4	0
Sat.	25	10 36 37	52	1 48	0
Sun.	26	10 15 44	52	1 31	0
Mon.	27	9 54 41	52	1 14	0
Tues.	28	9 33 29	53	0 57	0
Wed.	29	9 12 8	53	0 39	0
Thur.	30	8 50 38	53	0 21	0
Fri.	31	8 29 0	54	0 2	0
Sat.	32	N. 8 7 14	54	0 16	0

1860. AT GREENWICH APPARENT NOON. 1860.

SEPTEMBER, 1860.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, *to be subt. from Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Sat.	1	N. 8 7 14	54	0 16	0
Sun.	2	7 45 19	54	0 35	0
Mon.	3	7 23 17	55	0 54	0
Tues.	4	7 1 8	55	1 14	0
Wed.	5	6 38 51	55	1 33	0
Thur.	6	6 16 28	56	1 53	0
Fri.	7	5 53 59	56	2 14	0
Sat.	8	5 31 23	56	2 34	0
Sun.	9	5 8 42	56	2 55	0
Mon.	10	4 45 56	57	3 15	0
Tues.	11	4 23 5	57	3 36	0
Wed.	12	4 0 8	57	3 57	0
Thur.	13	3 37 7	57	4 18	0
Fri.	14	3 14 3	57	4 39	0
Sat.	15	2 50 55	57	5 0	0
Sun.	16	2 27 44	58	5 21	0
Mon.	17	2 4 29	58	5 42	0
Tues.	18	1 41 12	58	6 3	0
Wed.	19	1 17 53	58	6 24	0
Thur.	20	0 54 33	58	6 45	0
Fri.	21	0 31 11	58	7 6	0
Sat.	22	N. 0 7 47	58	7 27	0
Sun.	23	S. 0 15 36	58	7 48	0
Mon.	24	0 39 1	58	8 8	0
Tues.	25	1 2 25	58	8 29	0
Wed.	26	1 25 50	58	8 49	0
Thur.	27	1 49 14	58	9 9	0
Fri.	28	2 12 37	58	9 29	0
Sat.	29	2 35 58	58	9 49	0
Sun.	30	2 59 19	58	10 8	0
Mon.	31	S. 3 22 37	58	10 28	0

OCTOBER, 1860.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, *to be subt. from Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Mon.	1	S. 3 22 37	58	10 28	0
Tues.	2	3 45 54	58	10 46	0
Wed.	3	4 9 8	58	11 5	0
Thur.	4	4 32 18	57	11 23	0
Fri.	5	4 55 26	57	11 41	0
Sat.	6	5 18 31	57	11 59	0
Sun.	7	5 41 31	57	12 16	0
Mon.	8	6 4 27	57	12 32	0
Tues.	9	6 27 19	57	12 48	0
Wed.	10	6 50 5	56	13 4	0
Thur.	11	7 12 46	56	13 19	0
Fri.	12	7 35 21	56	13 34	0
Sat.	13	7 57 50	56	13 48	0
Sun.	14	8 20 13	55	14 1	0
Mon.	15	8 42 28	55	14 14	0
Tues.	16	9 4 35	55	14 27	0
Wed.	17	9 26 35	54	14 39	0
Thur.	18	9 48 27	54	14 50	0
Fri.	19	10 10 10	54	15 1	0
Sat.	20	10 31 44	53	15 11	0
Sun.	21	10 53 9	53	15 20	0
Mon.	22	11 14 23	52	15 29	0
Tues.	23	11 35 28	52	15 37	0
Wed.	24	11 56 21	52	15 45	0
Thur.	25	12 17 4	51	15 51	0
Fri.	26	12 37 35	51	15 57	0
Sat.	27	12 57 55	50	16 3	0
Sun.	28	13 18 2	50	16 7	0
Mon.	29	13 37 57	49	16 11	0
Tues.	30	13 57 39	48	16 14	0
Wed.	31	14 17 8	48	16 16	0
Thur.	32	S. 14 36 23	47	16 18	0

1860. AT GREENWICH APPARENT NOON. 1860.

NOVEMBER, 1860.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, to be subt. from Apparent Time.	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Thur.	1	S. 14 36 23	47	16 18	0
Fri.	2	14 55 23	47	16 18	0
Sat.	3	15 14 10	46	16 18	0
Sun.	4	15 32 41	45	16 17	0
Mon.	5	15 50 57	45	16 15	0
Tues.	6	16 8 58	44	16 12	0
Wed.	7	16 26 42	43	16 9	0
Thur.	8	16 44 10	43	16 4	0
Fri.	9	17 1 20	42	15 59	0
Sat.	10	17 18 13	41	15 53	0
Sun.	11	17 34 49	41	15 46	0
Mon.	12	17 51 6	40	15 38	0
Tues.	13	18 7 5	39	15 29	0
Wed.	14	18 22 44	38	15 20	0
Thur.	15	18 38 4	37	15 9	0
Fri.	16	18 53 4	37	14 58	0
Sat.	17	19 7 44	36	14 46	0
Sun.	18	19 22 3	35	14 33	0
Mon.	19	19 36 2	34	14 19	0
Tues.	20	19 49 38	33	14 5	0
Wed.	21	20 2 54	32	13 49	0
Thur.	22	20 15 47	31	13 33	0
Fri.	23	20 28 17	30	13 16	0
Sat.	24	20 40 25	29	12 59	0
Sun.	25	20 52 10	28	12 40	0
Mon.	26	21 3 31	27	12 21	0
Tues.	27	21 14 28	26	12 2	0
Wed.	28	21 25 2	25	11 41	0
Thur.	29	21 35 11	24	11 20	0
Fri.	30	21 44 55	23	10 58	0
Sat.	31	S. 21 54 15	22	10 35	0

DECEMBER, 1860.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, to be subt. from / added to Apparent Time.	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Sat.	1	S. 21 54 15	22	10 35	0
Sun.	2	22 3 9	21	10 12	0
Mon.	3	22 11 38	20	9 48	1
Tues.	4	22 19 41	19	9 24	1
Wed.	5	22 27 18	18	8 59	1
Thur.	6	22 34 29	17	8 33	1
Fri.	7	22 41 13	16	8 7	1
Sat.	8	22 47 31	15	7 41	1
Sun.	9	22 53 21	14	7 14	1
Mon.	10	22 58 44	12	6 46	1
Tues.	11	23 3 40	11	6 18	1
Wed.	12	23 8 9	10	5 50	1
Thur.	13	23 12 10	9	5 21	1
Fri.	14	23 15 43	8	4 53	1
Sat.	15	23 18 48	7	4 23	1
Sun.	16	23 21 25	5	3 54	1
Mon.	17	23 23 34	4	3 24	1
Tues.	18	23 25 15	3	2 55	1
Wed.	19	23 26 28	2	2 25	1
Thur.	20	23 27 12	1	1 55	1
Fri.	21	23 27 29	0	1 25	1
Sat.	22	23 27 16	1	0 55	1
Sun.	23	23 26 36	2	0 25	1
Mon.	24	23 25 27	3	0 4	1
Tues.	25	23 23 50	4	0 34	1
Wed.	26	23 21 45	5	1 4	1
Thur.	27	23 19 11	6	1 33	1
Fri.	28	23 16 10	8	2 2	1
Sat.	29	23 12 41	9	2 32	1
Sun.	30	23 8 43	10	3 1	1
Mon.	31	23 4 18	11	3 29	1
Tues.	32	S. 22 59 26	12	3 58	1

THE MOON'S RIGHT ASCENSION AND DECLINATION.

JANUARY, 1860.				FEBRUARY, 1860.			
MEAN TIME.				MEAN TIME.			
RIGHT ASCENSION.		DECLINATION.		RIGHT ASCENSION.		DECLINATION.	
Day.	Midnight.	Noon.	Midnight.	Day.	Midnight.	Noon.	Midnight.
	h. m. s.	° ′ ″	° ′ ″		h. m. s.	° ′ ″	° ′ ″
1	0 55 26	N. 8 28 5	N.11 5 59	1	4 3 9	N.24 30 2	N.25 44 0
2	1 42 24	13 39 19	16 6 19	2	5 3 31	26 37 12	27 7 16
3	2 33 7	18 25 3	20 33 14	3	6 6 39	27 12 8	26 50 21
4	3 28 18	22 28 21	24 7 40	4	7 10 33	26 1 8	24 44 39
5	4 28 5	25 28 16	26 27 19	5	8 13 9	23 1 54	20 54 47
6	5 31 29	27 2 11	27 10 43	6	9 13 10	18 25 53	15 38 21
7	6 36 25	26 51 30	26 4 3	7	10 10 16	12 35 45	9 21 45
8	7 40 26	24 48 51	23 7 24	8	11 4 59	N. 6 0 9	N. 2 34 36
9	8 41 39	21 2 3	18 35 48	9	11 58 14	S. 0 51 23	S. 4 14 31
10	9 39 19	15 52 3	12 54 25	10	12 51 4	7 31 46	10 40 24
11	10 33 46	9 46 30	N. 6 31 46	11	13 44 23	13 37 54	16 22 3
12	11 25 54	N. 3 13 31	S. 0 5 14	12	14 38 49	18 50 51	21 2 35
13	12 16 53	S. 3 21 43	6 33 21	13	15 34 27	22 55 45	24 29 11
14	13 7 51	9 37 51	12 33 3	14	16 30 55	25 41 58	26 33 32
15	13 59 44	15 16 57	17 47 43	15	17 27 18	27 3 39	27 12 30
16	14 53 8	20 3 36	22 2 58	16	18 22 30	27 0 32	26 28 36
17	15 48 8	23 44 26	25 6 42	17	19 15 36	25 37 47	24 29 23
18	16 44 13	26 8 49	26 50 7	18	20 6 3	23 4 51	21 25 46
19	17 40 23	27 10 16	27 9 21	19	20 53 48	19 33 41	17 30 13
20	18 35 26	26 47 50	26 6 33	20	21 39 10	15 16 56	12 55 20
21	19 28 17	25 6 41	23 49 36	21	22 22 44	10 26 53	7 52 59
22	20 18 24	22 16 55	20 30 17	22	23 5 14	S. 5 14 59	S. 2 34 13
23	21 5 44	18 31 23	16 21 57	23	23 47 30	N. 0 8 4	N. 2 50 35
24	21 50 39	14 3 35	11 37 50	24	0 30 25	5 32 2	8 11 9
25	22 33 50	9 6 9	6 29 56	25	1 14 50	10 46 32	13 16 46
26	23 16 5	S. 3 50 25	S. 1 8 53	26	2 1 40	15 40 21	17 55 36
27	23 58 19	N. 1 33 31	N. 4 15 36	27	2 51 41	20 0 45	21 53 54
28	0 41 30	6 56 10	9 33 59	28	3 45 21	23 33 1	24 55 57
29	1 26 41	12 7 42	14 35 54	29	4 42 40	N.26 0 33	N.26 44 45
30	2 14 50	16 56 55	19 8 59	30			
31	3 6 50	N.21 10 3	N.22 57 52	31			

THE MOON'S RIGHT ASCENSION AND DECLINATION.

MARCH, 1860.				APRIL, 1860.			
MEAN TIME.				MEAN TIME.			
RIGHT ASCENSION.		DECLINATION.		RIGHT ASCENSION.		DECLINATION.	
Day.	Midnight.	Noon.	Midnight.	Day.	Midnight.	Noon.	Midnight.
	h. m. s.	° ′ ″	° ′ ″		h. m. s.	° ′ ″	° ′ ″
1	5 42 51	N.27 6 38	N.27 4 38	1	9 20 42	N.17 24 26	N.14 42 13
2	6 44 28	26 37 38	25 45 5	2	10 15 31	11 45 53	8 38 8
3	7 45 51	24 27 9	22 44 36	3	11 9 18	N. 5 21 54	N. 2 0 17
4	8 45 40	20 38 56	18 12 12	4	12 2 59	S. 1 22 32	S. 4 46 15
5	9 43 22	15 27 1	12 26 20	5	12 57 29	8 4 33	11 15 9
6	10 39 7	9 13 27	N. 5 51 50	6	13 53 31	14 14 50	17 0 36
7	11 33 37	N. 2 25 4	S. 1 3 14	7	14 51 23	19 29 38	21 39 33
8	12 27 49	S. 4 29 33	7 50 28	8	15 50 42	23 28 19	24 54 27
9	13 22 34	11 2 46	14 3 27	9	16 50 24	25 57 4	26 35 50
10	14 18 28	16 49 50	19 19 31	10	17 49 2	26 51 2	26 43 27
11	15 15 39	21 30 28	23 21 4	11	18 45 17	26 14 20	25 25 14
12	16 13 40	24 50 4	25 56 43	12	19 38 21	24 17 55	22 54 13
13	17 11 31	26 40 44	27 2 13	13	20 28 4	21 16 0	19 25 3
14	18 8 3	27 1 45	26 40 16	14	21 14 49	17 23 4	15 11 37
15	19 2 14	25 59 0	24 59 21	15	21 59 16	12 52 9	10 26 1
16	19 53 31	23 42 55	22 11 18	16	22 42 17	7 54 28	S. 5 18 44
17	20 41 53	20 26 9	18 29 3	17	23 24 45	S. 2 39 58	N. 0 0 39
18	21 27 42	16 21 32	14 5 4	18	0 7 36	N. 2 41 54	5 22 32
19	22 11 36	11 41 4	9 10 52	19	0 51 44	8 1 11	10 36 26
20	22 54 21	6 35 46	S. 3 57 1	20	1 38 0	13 6 41	15 30 14
21	23 36 46	S. 1 15 55	N. 1 26 18	21	2 27 8	17 45 15	19 49 45
22	0 19 42	N. 4 8 19	6 48 46	22	3 19 33	21 41 42	23 18 58
23	1 4 0	9 26 17	11 59 20	23	4 15 12	24 39 30	25 41 20
24	1 50 29	14 26 20	16 45 38	24	5 13 23	26 22 42	26 42 14
25	2 39 50	18 55 25	20 53 49	25	6 12 47	26 38 55	26 12 17
26	3 32 27	22 38 52	24 8 35	26	7 11 53	25 22 25	24 9 52
27	4 28 17	25 21 1	26 14 16	27	8 9 28	22 35 44	20 41 27
28	5 26 40	26 46 40	26 56 51	28	9 4 58	18 28 51	15 59 56
29	6 26 22	26 43 49	26 7 2	29	9 58 33	13 16 56	10 22 12
30	7 25 56	25 6 30	23 42 43	30	10 50 52	N. 7 18 10	N. 4 7 23
31	8 24 13	N.21 56 44	N.19 50 0	31			

THE MOON'S RIGHT ASCENSION AND DECLINATION.

MAY, 1860.				JUNE, 1860.			
MEAN TIME.				MEAN TIME.			
RIGHT ASCENSION.		DECLINATION.		RIGHT ASCENSION.		DECLINATION.	
Day.	Midnight.	Noon.	Midnight.	Day.	Midnight.	Noon.	Midnight.
	h. m. s.	° ′ ″	° ′ ″		h. m. s.	° ′ ″	° ′ ″
1	11 42 53	N. 0 52 29	S. 2 23 48	1	15 4 6	S. 20 30 37	S. 22 25 58
2	12 35 38	S. 5 38 38	8 49 7	2	16 3 14	24 1 0	25 14 4
3	13 30 4	11 52 16	14 45 6	3	17 3 16	26 3 58	26 30 10
4	14 26 45	17 24 41	19 48 12	4	18 2 31	26 32 44	26 12 24
5	15 25 39	21 53 4	23 37 6	5	18 59 23	25 30 24	24 28 24
6	16 25 55	24 58 33	25 56 19	6	19 52 54	23 8 23	21 32 26
7	17 26 5	26 29 52	26 39 25	7	20 42 51	19 42 41	17 41 10
8	18 24 25	26 25 46	25 50 13	8	21 29 37	15 29 48	13 10 21
9	19 19 42	24 54 28	23 40 30	9	22 13 58	10 44 24	8 13 23
10	20 11 23	22 10 21	20 26 3	10	22 56 51	5 38 36	S. 3 1 14
11	20 59 39	18 29 35	16 22 46	11	23 39 16	S. 0 22 26	N. 2 16 45
12	21 45 7	14 7 16	11 44 36	12	0 22 15	N. 4 55 13	7 31 49
13	22 28 39	9 16 7	6 43 5	13	1 6 49	10 5 20	12 34 24
14	23 11 13	S. 4 6 40	S. 1 27 59	14	1 53 58	14 57 33	17 13 5
15	23 53 49	N. 1 11 51	N. 3 51 42	15	2 44 30	19 19 5	21 13 31
16	0 37 27	6 30 24	9 6 38	16	3 38 54	22 54 7	24 18 33
17	1 23 3	11 39 0	14 5 55	17	4 36 58	25 24 29	26 9 44
18	2 11 32	16 25 38	18 36 15	18	5 37 38	26 32 23	26 31 4
19	3 3 28	20 35 41	22 21 42	19	6 39 7	26 4 59	25 14 3
20	3 59 0	23 52 3	25 4 30	20	7 39 33	23 58 56	22 21 0
21	4 57 33	25 56 59	26 27 43	21	8 37 38	20 22 9	18 4 46
22	5 57 45	26 35 23	26 19 12	22	9 32 56	15 31 29	12 45 5
23	6 57 53	25 39 3	24 35 25	23	10 25 50	9 48 23	6 44 12
24	7 56 25	23 9 23	21 22 32	24	11 17 11	N. 3 35 13	N. 0 24 4
25	8 52 30	19 16 52	16 54 34	25	12 8 7	S. 2 46 42	S. 5 54 38
26	9 46 8	14 18 2	11 29 43	26	12 59 42	8 57 22	11 52 31
27	10 37 55	8 32 5	N. 5 27 37	27	13 52 53	14 37 46	17 10 49
28	11 28 50	N. 2 18 46	S. 0 52 2	28	14 48 14	19 29 26	21 31 28
29	12 20 0	S. 4 2 18	7 9 33	29	15 45 43	23 14 57	24 38 11
30	13 12 27	10 11 14	13 4 47	30	16 44 33	S. 25 39 48	S. 26 18 54
31	14 7 3	S. 15 47 35	S. 18 17 2				

THE MOON'S RIGHT ASCENSION AND DECLINATION.

JULY, 1860.				AUGUST, 1860.			
MEAN TIME.				MEAN TIME.			
RIGHT ASCENSION.		DECLINATION.		RIGHT ASCENSION.		DECLINATION.	
Day.	Midnight.	Noon.	Midnight.	Day.	Midnight.	Noon.	Midnight.
	h. m. s.	° ′ ″	° ′ ″		h. m. s.	° ′ ″	° ′ ″
1	17 43 23	S. 26 35 6	S. 26 28 33	1	21 0 9	S. 18 10 24	S. 16 0 56
2	18 40 38	26 0 0	25 10 39	2	21 46 2	13 42 40	11 17 19
3	19 35 6	24 2 4	22 36 8	3	22 29 54	8 46 29	6 11 39
4	20 26 14	20 54 50	19 0 15	4	23 12 35	S. 3 34 10	S. 0 55 22
5	21 14 9	16 54 23	14 39 7	5	23 54 57	N. 1 43 33	N. 4 21 24
6	21 59 23	12 16 16	9 47 27	6	0 37 54	6 57 1	9 29 12
7	22 42 47	7 14 9	S. 4 37 44	7	1 22 23	11 56 45	14 18 22
8	23 25 14	S. 1 59 25	N. 0 39 37	8	2 9 15	16 32 40	18 38 8
9	0 7 45	N. 3 18 14	5 55 21	9	2 59 15	20 33 6	22 15 47
10	0 51 19	8 29 50	11 0 28	10	3 52 51	23 44 15	24 56 29
11	1 36 56	13 25 59	15 44 56	11	4 49 54	25 50 29	26 24 16
12	2 25 31	17 55 46	19 56 40	12	5 49 38	26 36 5	26 24 33
13	3 17 46	21 45 42	23 20 45	13	6 50 36	25 48 44	24 48 16
14	4 13 55	24 39 34	25 39 52	14	7 51 12	23 23 29	21 35 22
15	5 13 26	26 19 30	26 36 31	15	8 50 13	19 25 32	16 56 12
16	6 14 58	26 29 25	25 57 18	16	9 47 12	14 10 0	11 9 57
17	7 16 39	24 59 55	23 37 50	17	10 42 22	7 59 19	N. 4 41 27
18	8 16 47	21 52 18	19 45 16	18	11 36 27	N. 1 19 48	S. 2 2 17
19	9 14 28	17 19 11	14 36 54	19	12 30 20	S. 5 21 30	8 34 42
20	10 9 35	11 41 29	8 36 7	20	13 24 56	11 38 58	14 31 33
21	11 2 47	N. 5 23 59	N. 2 8 10	21	14 20 50	17 9 55	19 31 51
22	11 54 59	S. 1 8 19	S. 4 22 38	22	15 18 13	21 35 22	23 18 51
23	12 47 15	7 32 5	10 34 7	23	16 16 37	24 41 2	25 41 3
24	13 40 32	13 26 18	16 6 22	24	17 15 2	26 18 31	26 33 29
25	14 35 28	18 32 10	20 41 41	25	18 12 14	26 26 24	25 58 12
26	15 32 11	22 33 8	24 4 56	26	19 7 6	25 10 5	24 3 34
27	16 30 10	25 15 51	26 4 57	27	19 59 2	22 40 18	21 2 4
28	17 28 20	26 31 49	26 36 24	28	20 47 57	19 10 39	17 7 50
29	18 25 19	26 19 12	25 41 7	29	21 34 12	14 55 21	12 34 52
30	19 19 57	24 43 25	23 27 40	30	22 18 24	10 7 55	7 36 2
31	20 11 35	S. 21 55 40	S. 20 9 16	31	23 1 17	S. 5 0 37	S. 2 23 1

THE MOON'S RIGHT ASCENSION AND DECLINATION.

SEPTEMBER, 1860.				OCTOBER, 1860.			
MEAN TIME.				MEAN TIME.			
RIGHT ASCENSION.		DECLINATION.		RIGHT ASCENSION.		DECLINATION.	
Day.	Midnight.	Noon.	Midnight.	Day.	Midnight.	Noon.	Midnight.
	h. m. s.	° ′ ″	° ′ ″		h. m. s.	° ′ ″	° ′ ″
1	23 43 42	N. 0 15 29	N. 2 53 37	1	1 45 3	N.14 1 57	N.16 14 40
2	0 26 28	5 30 7	8 3 47	2	2 32 59	18 18 16	20 11 10
3	1 10 24	10 33 20	12 57 28	3	3 23 41	21 51 42	23 18 15
4	1 56 17	15 14 48	17 23 57	4	4 17 9	24 29 11	25 22 55
5	2 44 49	19 23 21	21 11 27	5	5 12 54	25 58 3	26 13 22
6	3 36 25	22 46 32	24 6 53	6	6 10 3	26 7 58	25 41 13
7	4 31 7	25 10 45	25 56 24	7	7 7 28	24 52 53	23 43 9
8	5 28 25	26 22 17	26 27 0	8	8 4 14	22 12 34	20 22 4
9	6 27 17	26 9 28	25 29 3	9	8 59 48	18 12 56	15 46 47
10	7 26 27	24 25 31	22 59 8	10	9 54 15	13 5 28	10 11 11
11	8 24 51	21 10 46	19 1 41	11	10 48 5	7 6 21	N. 3 53 36
12	9 21 52	16 33 42	13 49 2	12	11 42 7	N. 0 35 52	S. 2 43 45
13	10 17 33	10 50 17	7 40 19	13	12 37 17	S. 6 1 57	9 15 18
14	11 12 26	N. 4 22 20	N. 0 59 40	14	13 34 20	12 20 17	15 13 27
15	12 7 20	S. 2 24 13	S. 5 45 48	15	14 33 38	17 51 30	20 11 20
16	13 3 4	9 1 35	12 8 10	16	15 34 51	22 10 22	23 46 28
17	14 0 16	15 2 21	17 41 11	17	16 36 49	24 58 13	25 44 55
18	14 59 6	20 2 1	22 2 41	18	17 37 53	26 6 35	26 3 56
19	15 59 4	23 41 25	24 57 4	19	18 36 24	25 38 16	24 51 20
20	16 59 4	25 48 58	26 17 6	20	19 31 23	23 45 8	22 21 51
21	17 57 43	26 21 57	26 4 30	21	20 22 36	20 43 36	18 52 30
22	18 53 48	25 26 5	24 28 22	22	21 10 26	16 50 29	14 39 22
23	19 46 40	23 13 8	21 42 17	23	21 55 36	12 20 44	9 56 7
24	20 36 16	19 57 40	18 1 7	24	22 39 0	7 26 51	S. 4 54 11
25	21 22 58	15 54 21	13 39 0	25	23 21 34	S. 2 19 20	N. 0 16 32
26	22 7 27	11 16 37	8 48 37	26	0 4 12	N. 2 52 17	5 26 43
27	22 50 31	6 16 21	S. 3 41 8	27	0 47 46	7 58 36	10 26 40
28	23 33 0	S. 1 4 14	N. 1 33 7	28	1 33 5	12 49 30	15 5 39
29	0 15 44	N. 4 9 40	6 44 8	29	2 20 46	17 13 34	19 11 33
30	0 59 30	N. 9 15 15	N.11 41 39	30	3 11 15	20 57 56	22 30 56
				31	4 4 30	N.23 48 51	N.24 50 2

THE MOON'S RIGHT ASCENSION AND DECLINATION.

NOVEMBER, 1860.				DECEMBER, 1860.			
MEAN TIME.				MEAN TIME.			
RIGHT ASCENSION.		DECLINATION.		RIGHT ASCENSION.		DECLINATION.	
Day.	Midnight.	Noon.	Midnight.	Day.	Midnight.	Noon.	Midnight.
	h. m. s.	° ′ ″	° ′ ″		h. m. s.	° ′ ″	° ′ ″
1	5 0 2	N.25 33 0	N.25 56 32	1	7 36 54	N.23 12 53	N.21 40 57
2	5 56 50	25 59 41	25 41 56	2	8 31 54	19 50 43	17 43 52
3	6 53 44	25 3 7	24 3 29	3	9 24 56	15 22 18	12 48 2
4	7 49 42	22 43 42	21 4 45	4	10 16 26	10 3 11	7 9 52
5	8 44 11	19 7 55	16 54 42	5	11 7 12	N. 4 10 16	N. 1 6 38
6	9 37 12	14 26 49	11 46 7	6	11 58 18	S. 1 58 46	S. 5 3 34
7	10 29 17	8 54 39	N. 5 54 31	7	12 50 48	8 5 17	11 1 20
8	11 21 18	N. 2 48 2	S. 0 22 21	8	13 45 39	13 49 3	16 25 35
9	12 14 17	S. 3 34 0	6 44 4	9	14 43 24	18 48 8	20 53 55
10	13 9 12	9 49 35	12 47 22	10	15 43 52	22 40 18	24 5 1
11	14 6 47	15 34 11	18 6 46	11	16 45 57	25 6 17	25 42 56
12	15 7 9	20 22 0	22 17 1	12	17 47 48	25 54 34	25 41 35
13	16 9 31	23 49 25	24 57 27	13	18 47 28	25 5 4	24 6 43
14	17 12 14	25 40 6	25 57 9	14	19 43 37	22 48 41	21 13 22
15	18 13 18	25 49 13	25 17 37	15	20 35 48	19 23 14	17 20 44
16	19 11 6	24 24 13	23 11 15	16	21 24 21	15 8 8	12 47 34
17	20 4 53	21 41 6	19 56 10	17	22 9 59	10 20 53	7 49 47
18	20 54 44	17 58 50	15 51 11	18	22 53 42	5 15 43	S. 2 40 1
19	21 41 20	13 35 12	11 12 37	19	23 36 30	S. 0 3 52	N. 2 31 36
20	22 25 35	8 44 57	6 13 36	20	0 19 25	N. 5 5 21	7 36 18
21	23 8 29	S. 3 39 49	S. 1 4 45	21	1 3 24	10 3 21	12 25 22
22	23 51 3	N. 1 30 32	N. 4 4 55	22	1 49 23	14 41 3	16 49 4
23	0 34 15	6 37 19	9 6 34	23	2 38 7	18 47 53	20 35 51
24	1 19 0	11 31 27	13 50 37	24	3 30 3	22 11 10	23 32 1
25	2 6 5	16 2 36	18 5 49	25	4 25 8	24 36 30	25 22 49
26	2 56 4	19 58 34	21 39 1	26	5 22 42	25 49 21	25 54 48
27	3 49 8	23 5 20	24 15 40	27	6 21 26	25 38 17	24 59 25
28	4 44 53	25 8 18	25 41 42	28	7 19 50	23 58 22	22 35 54
29	5 42 20	25 54 39	25 46 21	29	8 16 41	20 53 17	18 52 11
30	6 40 7	N.25 16 26	N.24 25 4	30	9 11 25	16 34 40	14 2 58
				31	10 4 11	N.11 19 30	N. 8 26 45

1860. AT GREENWICH MEAN NOON. 1860.

JANUARY.				FEBRUARY.				MARCH.			
Day of the Week.	Day of the Month.	THE MOON'S Age. Noon.	THE MOON'S Meridian Passage.	Day of the Week.	Day of the Month.	THE MOON'S Age. Noon.	THE MOON'S Meridian Passage.	Day of the Week.	Day of the Month.	THE MOON'S Age. Noon.	THE MOON'S Meridian Passage.
		d.	h. m.			d.	h. m.			d.	h. m.
Sun.	1	8·4	6 1·7	Wed.	1	9·5	7 6·4	Thur.	1	8·7	6 50·5
Mon.	2	9·4	6 45·3	Thur.	2	10·5	8 4·4	Fri.	2	9·7	7 50·5
Tues.	3	10·4	7 32·8	Fri.	3	11·5	9 5·8	Sat.	3	10·7	8 50·4
Wed.	4	11·4	8 25·1	Sat.	4	12·5	10 8·4	*Sun.*	4	11·7	9 48·8
Thur.	5	12·4	9 22·5	*Sun.*	5	13·5	11 9·7	Mon.	5	12·7	10 44·8
Fri.	6	13·4	10 24·2	Mon.	6	14·5	12 8·0	Tues.	6	13·7	11 38·6
Sat.	7	14·4	11 27·9	Tues.	7	15·5	13 3·2	Wed.	7	14·7	12 31·0
Sun.	8	15·4	12 30·6	Wed.	8	16·5	[illegible] 5·7	Thur.	8	15·7	13 23·1
Mon.	9	16·4	13 30·1	Thur.	9	17·5	[illegible]·6	Fri.	9	16·7	14 15·8
Tues.	10	17·4	14 25·6	Fri.	10	18·5	15 37·3	Sat.	10	17·7	15 9·9
Wed.	11	18·4	15 17·6	Sat.	11	19·5	16 28·6	*Sun.*	11	18·7	16 5·4
Thur.	12	19·4	16 7·2	*Sun.*	12	20·5	17 21·2	Mon.	12	19·7	17 1·6
Fri.	13	20·4	16 55·7	Mon.	13	21·5	18 15·1	Tues.	13	20·7	17 57·4
Sat.	14	21·4	17 44·5	Tues.	14	22·5	19 9·7	Wed.	14	21·7	18 51·4
Sun.	15	22·4	18 34·5	Wed.	15	23·5	20 3·8	Thur.	15	22·7	19 42·6
Mon.	16	23·4	19 26·2	Thur.	16	24·5	20 56·3	Fri.	16	23·7	20 30·4
Tues.	17	24·4	20 19·6	Fri.	17	25·5	21 46·1	Sat.	17	24·7	21 15·1
Wed.	18	25·4	21 13·9	Sat.	18	26·5	22 32·9	*Sun.*	18	25·7	21 57·4
Thur.	19	26·4	22 7·7	*Sun.*	19	27·5	23 16·9	Mon.	19	26·7	22 37·9
Fri.	20	27·4	22 59·8	Mon.	20	28·5	23 58·5	Tues.	20	27·7	23 17·5
Sat.	21	28·4	23 49·0	Tues.	21	29·5	♂	Wed.	21	28·7	23 57·2
Sun.	22	29·4	♂	Wed.	22	0·7	0 38·6	Thur.	22	29·7	♂
Mon.	23	0·5	0 35·2	Thur.	23	1·7	1 18·0	Fri.	23	0·9	0 37·9
Tues.	24	1·5	1 18·5	Fri.	24	2·7	1 57·6	Sat.	24	1·9	1 20·6
Wed.	25	2·5	1 59·5	Sat.	25	3·7	2 38·5	*Sun.*	25	2·9	2 6·1
Thur.	26	3·5	2 39·2	*Sun.*	26	4·7	3 21·6	Mon.	26	3·9	2 55·1
Fri.	27	4·5	3 18·4	Mon.	27	5·7	4 8·0	Tues.	27	4·9	3 47·7
Sat.	28	5·5	3 58·3	Tues.	28	6·7	4 58·3	Wed.	28	5·9	4 43·5
Sun.	29	6·5	4 39·9	Wed.	29	7·7	5 52·6	Thur.	29	6·9	5 41·2
Mon.	30	7·5	5 24·5					Fri.	30	7·9	6 39·2
Tues.	31	8·5	6 13·1	Thur.	30	8·7	6 50·5	Sat.	31	8·9	7 36·3
Wed.	32	9·5	7 6·4					*Sun.*	32	9·9	8 31·1

1860. AT GREENWICH MEAN NOON. 1860.

APRIL.				MAY.				JUNE.			
Day of the Week.	Day of the Month.	THE MOON'S Age. Noon.	THE MOON'S Meridian Passage.	Day of the Week.	Day of the Month.	THE MOON'S Age. Noon.	THE MOON'S Meridian Passage.	Day of the Week.	Day of the Month.	THE MOON'S Age. Noon.	THE MOON'S Meridian Passage.
		d.	h. m.			d.	h. m.			d.	h. m.
Sun.	1	9·9	8 31·1	Tues.	1	10·3	8 56·2	Fri.	1	11·7	10 17·5
Mon.	2	10·9	9 23·9	Wed.	2	11·3	9 46·6	Sat.	2	12·7	11 14·8
Tues.	3	11·9	10 15·6	Thur.	3	12·3	10 38·7	*Sun.*	3	13·7	12 13·2
Wed.	4	12·9	11 7·0	Fri.	4	13·3	11 33·4	Mon.	4	14·7	13 10·6
Thur.	5	13·9	11 59·4	Sat.	5	14·3	12 30·5	Tues.	5	15·7	14 5·3
Fri.	6	14·9	12 53·5	*Sun.*	6	15·3	13 29·2	Wed.	6	16·7	14 56·3
Sat.	7	15·9	13 49·7	Mon.	7	16·3	14 27·6	Thur.	7	17·7	15 43·3
Sun.	8	16·9	14 47·3	Tues.	8	17·3	15 23·8	Fri.	8	18·7	16 26·9
Mon.	9	17·9	15 45·3	Wed.	9	18·3	16 16·4	Sat.	9	19·7	17 8·1
Tues.	10	18·9	16 41·8	Thur.	10	19·3	17 5·0	*Sun.*	10	20·7	17 47·9
Wed.	11	19·9	17 35·4	Fri.	11	20·3	17 50·0	Mon.	11	21·7	18 27·5
Thur.	12	20·9	18 25·3	Sat.	12	21·3	18 32·2	Tues.	12	22·7	19 8·0
Fri.	13	21·9	19 11·6	*Sun.*	13	22·3	19 12·5	Wed.	13	23·7	19 50·6
Sat.	14	22·9	19 54·9	Mon.	14	23·3	19 52·1	Thur.	14	24·7	20 36·3
Sun.	15	23·9	20 36·0	Tues.	15	24·3	20 32·1	Fri.	15	25·7	21 25·9
Mon.	16	24·9	21 15·8	Wed.	16	25·3	21 13·5	Sat.	16	26·7	22 19·9
Tues.	17	25·9	21 55·4	Thur.	17	26·3	21 57·6	*Sun.*	17	27·7	23 17·6
Wed.	18	26·9	22 35·9	Fri.	18	27·3	22 45·0	Mon.	18	28·7	☌
Thur.	19	27·9	23 18·2	Sat.	19	28·3	23 36·5	Tues.	19	0·3	0 17·3
Fri.	20	28·9	☌	*Sun.*	20	29·3	☌	Wed.	20	1·3	1 16·9
Sat.	21	0·3	0 3·2	Mon.	21	0·7	0 31·8	Thur.	21	2·3	2 14·3
Sun.	22	1·3	0 51·6	Tues.	22	1·7	1 29·7	Fri.	22	3·3	3 8·7
Mon.	23	2·3	1 43·7	Wed.	23	2·7	2 28·4	Sat.	23	4·3	4 0·2
Tues.	24	3·3	2 39·1	Thur.	24	3·7	3 26·0	*Sun.*	24	5·3	4 49·7
Wed.	25	4·3	3 36·5	Fri.	25	4·7	4 21·0	Mon.	25	6·3	5 38·3
Thur.	26	5·3	4 34·1	Sat.	26	5·7	5 13·2	Tues.	26	7·3	6 27·3
Fri.	27	6·3	5 30·4	*Sun.*	27	6·7	6 3·1	Wed.	27	8·3	7 17·8
Sat.	28	7·3	6 24·4	Mon.	28	7·7	6 51·8	Thur.	28	9·3	8 10·7
Sun.	29	8·3	7 16·2	Tues.	29	8·7	7 40·5	Fri.	29	10·3	9 6·2
Mon.	30	9·3	8 6·5	Wed.	30	9·7	8 30·4	Sat.	30	11·3	10 3·0
				Thur.	31	10·7	9 22·6				
Tues.	31	10·3	8 56·2					*Sun.*	31	12·3	11 0·1
				Fri.	32	11·7	10 17·5				

1860. AT GREENWICH MEAN NOON. 1860.

JULY.				AUGUST.				SEPTEMBER.			
Day of the Week.	Day of the Month.	THE MOON'S Age. Noon.	THE MOON'S Meridian Passage.	Day of the Week.	Day of the Month.	THE MOON'S Age. Noon.	THE MOON'S Meridian Passage.	Day of the Week.	Day of the Month.	THE MOON'S Age. Noon.	THE MOON'S Meridian Passage.
		d.	h. m.			d.	h. m.			d.	h. m.
Sun.	1	12·3	11 0·1	Wed.	1	13·9	12 17·4	Sat.	1	15·6	12 59·8
Mon.	2	13·3	11 55·5	Thur.	2	14·9	13 0·6	*Sun.*	2	16·6	13 39·8
Tues.	3	14·3	12 47·8	Fri.	3	15·9	13 41·5	Mon.	3	17·6	14 21·1
Wed.	4	15·3	13 36·4	Sat.	4	16·9	14 21·3	Tues.	4	18·6	15 4·6
Thur.	5	16·3	14 21·5	*Sun.*	5	17·9	15 0·8	Wed.	5	19·6	15 51·0
Fri.	6	17·3	15 3·8	Mon.	6	18·9	15 41·0	Thur.	6	20·6	16 40·9
Sat.	7	18·3	15 44·1	Tues.	7	19·9	16 23·1	Fri.	7	21·6	17 34·2
Sun.	8	19·3	16 23·7	Wed.	8	20·9	17 8·0	Sat.	8	22·6	18 30·1
Mon.	9	20·3	17 3·4	Thur.	9	21·9	17 56·4	*Sun.*	9	23·6	19 27·4
Tues.	10	21·3	17 44·6	Fri.	10	22·9	18 48·9	Mon.	10	24·6	20 24·7
Wed.	11	22·3	18 28·2	Sat.	11	23·9	19 45·0	Tues.	11	25·6	21 20·8
Thur.	12	23·3	19 15·3	*Sun.*	12	24·9	20 43·7	Wed.	12	26·6	22 15·3
Fri.	13	24·3	20 6·7	Mon.	13	25·9	21 43·1	Thur.	13	27·6	23 8·5
Sat.	14	25·3	21 2·2	Tues.	14	26·9	22 41·5	Fri.	14	28·6	☌
Sun.	15	26·3	22 1·1	Wed.	15	27·9	23 37·7	Sat.	15	0·2	0 1·2
Mon.	16	27·3	23 1·4	Thur.	16	28·9	☌	*Sun.*	16	1·2	0 54·3
Tues.	17	28·3	☌	Fri.	17	0·6	0 31·7	Mon.	17	2·2	1 48·9
Wed.	18	29·3	0 0·9	Sat.	18	1·6	1 24·1	Tues.	18	3·2	2 45·3
Thur.	19	0·9	0 58·1	*Sun.*	19	2·6	2 15·8	Wed.	19	4·2	3 43·2
Fri.	20	1·9	1 52·3	Mon.	20	3·6	3 7·9	Thur.	20	5·2	4 41·7
Sat.	21	2·9	2 44·0	Tues.	21	4·6	4 1·3	Fri.	21	6·2	5 39·1
Sun.	22	3·9	3 34·2	Wed.	22	5·6	4 56·3	Sat.	22	7·2	6 34·0
Mon.	23	4·9	4 24·1	Thur.	23	6·6	5 52·7	*Sun.*	23	8·2	7 25·4
Tues.	24	5·9	5 14·8	Fri.	24	7·6	6 49·4	Mon.	24	9·2	8 13·1
Wed.	25	6·9	6 7·1	Sat.	25	8·6	7 45·1	Tues.	25	10·2	8 57·6
Thur.	26	7·9	7 1·5	*Sun.*	26	9·6	8 38·3	Wed.	26	11·2	9 39·6
Fri.	27	8·9	7 57·5	Mon.	27	10·6	9 28·4	Thur.	27	12·2	10 19·9
Sat.	28	9·9	8 53·9	Tues.	28	11·6	10 15·1	Fri.	28	13·2	10 59·5
Sun.	29	10·9	9 49·2	Wed.	29	12·6	10 58·8	Sat.	29	14·2	11 39·3
Mon.	30	11·9	10 41·9	Thur.	30	13·6	11 40·3	*Sun.*	30	15·2	12 20·3
Tues.	31	12·9	11 31·4	Fri.	31	14·6	12 20·3	Mon.	31	16·2	13 3·2
Wed.	32	13·9	12 17·4	Sat.	32	15·6	12 59·8				

1860. AT GREENWICH MEAN NOON. 1860.

OCTOBER.				NOVEMBER.				DECEMBER.			
Day of the Week.	Day of the Month.	THE MOON'S Age. Noon.	THE MOON'S Meridian Passage.	Day of the Week.	Day of the Month.	THE MOON'S Age. Noon.	THE MOON'S Meridian Passage.	Day of the Week.	Day of the Month.	THE MOON'S Age. Noon.	THE MOON'S Meridian Passage.
		d.	h. m.			d.	h. m.			d.	h. m.
Mon.	1	16·2	13 3·2	Thur.	1	17·9	14 19·1	Sat.	1	18·5	14 59·1
Tues.	2	17·2	13 48·7	Fri.	2	18·9	15 14·1	*Sun.*	2	19·5	15 51·7
Wed.	3	18·2	14 37·3	Sat.	3	19·9	16 9·0	Mon.	3	20·5	16 42·2
Thur.	4	19·2	15 29·0	*Sun.*	4	20·9	17 2·7	Tues.	4	21·5	17 31·1
Fri.	5	20·2	16 23·0	Mon.	5	21·9	17 54·7	Wed.	5	22·5	18 19·5
Sat.	6	21·2	17 18·4	Tues.	6	22·9	18 45·1	Thur.	6	23·5	19 8·6
Sun.	7	22·2	18 13·9	Wed.	7	23·9	19 34·8	Fri.	7	24·5	19 59·5
Mon.	8	23·2	19 8·4	Thur.	8	24·9	20 24·8	Sat.	8	25·5	20 53·4
Tues.	9	24·2	20 1·5	Fri.	9	25·9	21 16·2	*Sun.*	9	26·5	21 50·5
Wed.	10	25·2	20 53·5	Sat.	10	26·9	22 10·1	Mon.	10	27·5	22 50·3
Thur.	11	26·2	21 45·2	*Sun.*	11	27·9	23 7·2	Tues.	11	28·5	23 51·0
Fri.	12	27·2	22 37·5	Mon.	12	28·9	☌	Wed.	12	29·5	☌
Sat.	13	28·2	23 31·5	Tues.	13	0·5	0 7·1	Thur.	13	1·0	0 50·4
Sun.	14	29·2	☌	Wed.	14	1·5	1 8·5	Fri.	14	2·0	1 46·4
Mon.	15	0·9	0 27·8	Thur.	15	2·5	2 9·0	Sat.	15	3·0	2 38·0
Tues.	16	1·9	1 26·6	Fri.	16	3·5	3 6·5	*Sun.*	16	4·0	3 25·4
Wed.	17	2·9	2 26·9	Sat.	17	4·5	3 59·7	Mon.	17	5·0	4 9·3
Thur.	18	3·9	3 27·0	*Sun.*	18	5·5	4 48·4	Tues.	18	6·0	4 50·7
Fri.	19	4·9	4 24·8	Mon.	19	6·5	5 33·2	Wed.	19	7·0	5 30·8
Sat.	20	5·9	5 18·9	Tues.	20	7·5	6 15·2	Thur.	20	8·0	6 10·8
Sun.	21	6·9	6 8·8	Wed.	21	8·5	6 55·5	Fri.	21	9·0	6 51·6
Mon.	22	7·9	6 54·9	Thur.	22	9·5	7 35·2	Sat.	22	10·0	7 34·4
Tues.	23	8·9	7 37·8	Fri.	23	10·5	8 15·4	*Sun.*	23	11·0	8 20·1
Wed.	24	9·9	8 18·6	Sat.	24	11·5	8 57·1	Mon.	24	12·0	9 9·3
Thur.	25	10·9	8 58·4	*Sun.*	25	12·5	9 41·2	Tues.	25	13·0	10 2·0
Fri.	26	11·9	9 38·1	Mon.	26	13·5	10 28·5	Wed.	26	14·0	10 57·5
Sat.	27	12·9	10 18·7	Tues.	27	14·5	11 19·2	Thur.	27	15·0	11 54·5
Sun.	28	13·9	11 1·2	Wed.	28	15·5	12 12·9	Fri.	28	16·0	12 51·0
Mon.	29	14·9	11 46·2	Thur.	29	16·5	13 8·5	Sat.	29	17·0	13 45·9
Tues.	30	15·9	12 34·3	Fri.	30	17·5	14 4·4	*Sun.*	30	18·0	14 38·3
Wed.	31	16·9	13 25·5	Sat.	31	18·5	14 59·1	Mon.	31	19·0	15 28·6
Thur.	32	17·9	14 19·1					Tues.	32	20·0	16 17·5

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Sun	W.	90 33 29	91 57 7	93 21 0	94 45 8
	Venus	W.	67 22 24	68 44 27	70 6 44	71 29 16
	Fomalhaut	W.	46 2 59	47 20 13	48 38 18	49 57 12
	Aldebaran	E.	57 42 41	56 13 24	54 43 56	53 4 17
	Jupiter	E.	100 32 3	98 59 45	97 27 12	95 54 25
2	Sun	W.	101 49 54	103 15 45	104 41 54	106 8 23
	Venus	W.	78 26 4	79 50 19	81 14 53	82 39 46
	Fomalhaut	W.	56 42 25	58 5 27	59 29 5	60 53 19
	Aldebaran	E.	45 43 37	44 13 1	42 42 17	41 11 26
	Pollux	E.	87 28 32	85 55 19	84 21 47	82 47 55
	Jupiter	E.	88 6 18	86 31 47	84 56 58	83 21 49
3	Sun	W.	113 25 59	114 54 36	116 23 35	117 52 58
	Venus	W.	89 49 22	91 16 23	92 43 47	94 11 34
	Fomalhaut	W.	68 3 1	69 30 35	70 58 41	72 27 17
	α Pegasi	W.	45 28 32	46 57 36	48 27 21	49 57 47
	Pollux	E.	74 53 30	73 17 33	71 41 13	70 4 30
	Jupiter	E.	75 20 53	73 43 37	72 5 56	70 27 53
	Saturn	E.	109 15 15	107 38 41	106 1 44	104 24 23
4	Sun	W.	125 25 51	126 57 40	128 29 54	130 2 33
	Venus	W.	101 36 28	103 6 41	104 37 19	106 8 23
	Fomalhaut	W.	79 57 42	81 29 12	83 1 10	84 33 35
	α Pegasi	W.	57 39 34	59 13 45	60 48 32	62 23 53
	Pollux	E.	61 55 6	60 16 1	58 36 32	56 56 38
	Jupiter	E.	62 11 38	60 31 8	58 50 13	57 8 53
	Saturn	E.	96 11 34	94 31 45	92 51 31	91 10 51
5	Fomalhaut	W.	92 21 59	93 56 51	95 32 5	97 7 40
	α Pegasi	W.	70 28 45	72 7 17	73 46 19	75 25 50
	α Arietis	W.	27 4 27	28 45 49	30 27 46	32 10 17
	Pollux	E.	48 31 5	46 48 46	45 6 4	43 22 59
	Jupiter	E.	48 35 42	46 51 48	45 7 28	43 22 42
	Saturn	E.	82 41 2	80 57 46	79 14 4	77 29 57
	Regulus	E.	85 19 36	83 36 40	81 53 19	80 9 32
6	α Pegasi	W.	83 50 22	85 32 35	87 15 11	88 58 11
	α Arietis	W.	40 50 42	42 36 14	44 22 12	46 8 36
	Jupiter	E.	34 32 37	32 45 22	30 57 45	29 9 46
	Saturn	E.	68 43 1	66 56 24	65 9 23	63 21 59
	Regulus	E.	71 24 16	69 37 59	67 51 19	66 4 15
7	α Arietis	W.	55 6 41	56 55 25	58 44 30	60 33 54
	Aldebaran	W.	24 39 21	26 19 1	28 0 5	29 42 22
	Saturn	E.	54 19 30	52 29 59	50 40 10	48 50 3
	Regulus	E.	57 3 26	55 14 15	53 24 45	51 34 57
	Spica	E.	111 6 0	109 16 54	107 27 27	105 37 42
8	α Arietis	W.	69 45 8	71 36 7	73 27 18	75 18 41
	Aldebaran	W.	38 27 16	40 14 16	42 1 47	43 49 45
	Saturn	E.	39 35 37	37 44 4	35 52 21	34 0 30
	Regulus	E.	42 22 2	40 30 46	38 39 19	36 47 42
	Spica	E.	96 24 55	94 33 39	92 42 11	90 50 33

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Sun	W.	96 9 32	97 34 12	98 59 9	100 24 23
	Venus	W.	72 52 4	74 15 9	75 38 30	77 2 8
	Fomalhaut	W.	51 16 51	52 37 13	53 58 17	55 20 2
	Aldebaran	E.	51 44 29	50 14 30	48 44 22	47 14 4
	Jupiter	E.	94 21 21	92 48 1	91 14 24	89 40 30
2	Sun	W.	107 35 12	109 2 22	110 29 53	111 57 45
	Venus	W.	84 4 59	85 30 33	86 56 28	88 22 44
	Fomalhaut	W.	62 18 8	63 43 32	65 9 29	66 35 59
	Aldebaran	E.	39 40 28	38 9 24	36 38 17	35 7 9
	Pollux	E.	81 13 44	79 39 12	78 4 19	76 29 5
	Jupiter	E.	81 46 20	80 10 30	78 24 19	76 57 47
3	Sun	W.	119 22 44	120 52 54	122 23 28	123 54 27
	Venus	W.	95 39 44	97 8 18	98 37 17	100 6 40
	Fomalhaut	W.	73 56 23	75 25 59	76 56 5	78 26 39
	a Pegasi	W.	51 28 52	53 0 36	54 32 58	56 5 58
	Pollux	E.	68 27 24	66 49 55	65 12 3	63 33 46
	Jupiter	E.	68 49 27	67 10 37	65 31 21	63 51 42
	Saturn	E.	102 46 38	101 8 29	99 29 55	97 50 57
4	Sun	W.	131 35 37	133 9 7	134 43 3	136 17 24
	Venus	W.	107 39 52	109 11 47	110 44 8	112 16 55
	Fomalhaut	W.	86 6 26	87 39 42	89 13 24	90 47 30
	a Pegasi	W.	63 59 47	65 36 14	67 13 13	68 50 44
	Pollux	E.	55 16 20	53 35 38	51 54 31	50 13 0
	Jupiter	E.	55 27 7	53 44 54	52 2 16	50 19 12
	Saturn	E.	89 29 45	87 48 13	86 6 16	84 23 52
5	Fomalhaut	W.	98 43 35	100 19 49	101 56 20	103 33 8
	a Pegasi	W.	77 5 50	78 46 19	80 27 14	82 8 35
	a Arietis	W.	33 53 21	35 36 56	37 21 2	39 5 38
	Pollux	E.	41 39 32	39 55 43	38 11 33	36 27 3
	Jupiter	E.	41 37 31	39 51 54	38 5 53	36 19 27
	Saturn	E.	75 45 24	74 0 25	72 15 1	70 29 13
	Regulus	E.	78 25 19	76 40 41	74 55 37	73 10 9
6	a Pegasi	W.	90 41 32	92 25 15	94 9 19	95 53 41
	a Arietis	W.	47 55 26	49 42 40	51 30 18	53 18 19
	Jupiter	E.	27 21 26	25 32 44	23 43 41	21 54 21
	Saturn	E.	61 34 12	59 46 3	57 57 32	56 8 41
	Regulus	E.	64 16 48	62 28 59	60 40 49	58 52 18
7	a Arietis	W.	62 23 36	64 13 35	66 3 51	67 54 22
	Aldebaran	W.	31 25 42	33 9 58	34 55 2	36 40 50
	Saturn	E.	46 59 39	45 9 0	43 18 6	41 26 58
	Regulus	E.	49 44 53	47 54 32	46 3 56	44 13 6
	Spica	E.	103 47 40	101 57 21	100 6 47	98 15 58
8	a Arietis	W.	77 10 14	79 1 55	80 53 45	82 45 42
	Aldebaran	W.	45 38 8	47 26 52	49 15 54	51 5 14
	Saturn	E.	32 8 31	30 16 25	28 24 15	26 32 2
	Regulus	E.	34 55 57	33 4 4	31 12 5	29 20 1
	Spica	E.	88 58 45	87 6 48	85 14 43	83 22 32

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
9	α Arietis	W.	84 37 44	86 29 50	88 22 0	90 14 12
	Aldebaran	W.	52 54 48	54 44 34	56 34 30	58 24 36
	Spica	E.	81 30 16	79 37 55	77 45 31	75 53 5
	Mars	E.	106 12 18	104 25 6	102 37 50	100 50 32
10	Aldebaran	W.	67 36 14	69 26 37	71 16 57	73 7 15
	Jupiter	W.	25 4 7	26 57 20	28 50 30	30 43 35
	Pollux	W.	25 2 41	26 52 59	28 43 28	30 34 2
	Spica	E.	66 31 4	64 38 49	62 46 40	60 54 37
	Mars	E.	91 54 4	90 6 54	88 19 49	86 32 50
11	Aldebaran	W.	82 17 4	84 6 35	85 55 54	87 45 1
	Jupiter	W.	40 7 4	41 59 16	43 51 16	45 43 4
	Pollux	W.	39 46 57	41 37 17	43 27 30	45 17 33
	Spica	E.	51 36 36	49 45 33	47 54 44	46 4 8
	Mars	E.	77 40 3	75 54 2	74 8 14	72 22 40
	Sun	E.	140 16 12	138 32 41	136 49 21	135 6 14
12	Jupiter	W.	54 58 26	56 48 43	58 38 42	60 28 24
	Pollux	W.	54 24 49	56 13 34	58 2 3	59 50 16
	Saturn	W.	20 28 7	22 17 4	24 5 51	25 54 26
	Spica	E.	36 55 7	35 6 12	33 17 37	31 29 22
	Mars	E.	63 38 39	61 54 43	60 11 4	58 27 44
	Antares	E.	82 39 28	80 50 8	79 1 6	77 12 21
	Sun	E.	126 34 10	124 52 32	123 11 12	121 30 9
13	Jupiter	W.	69 32 17	71 20 6	73 7 35	74 54 45
	Pollux	W.	68 46 59	70 33 25	72 19 31	74 5 18
	Saturn	W.	34 53 41	36 40 41	38 27 23	40 13 46
	Regulus	W.	31 45 59	33 32 38	35 18 58	37 4 59
	Mars	E.	49 56 15	48 15 2	46 34 11	44 53 44
	Antares	E.	68 13 16	66 26 24	64 39 52	62 53 40
	Sun	E.	113 9 26	111 30 15	109 51 23	108 12 51
14	Jupiter	W.	83 45 34	85 30 43	87 15 32	89 0 1
	Pollux	W.	82 49 19	84 33 8	86 16 37	87 59 46
	Saturn	W.	49 1 1	50 45 30	52 29 40	54 13 30
	Regulus	W.	45 50 15	47 34 20	49 18 5	51 1 30
	Mars	E.	36 37 34	34 59 38	33 22 10	31 45 11
	Antares	E.	54 7 42	52 23 30	50 39 38	48 56 7
	Sun	E.	100 5 9	98 28 37	96 52 24	95 16 32
15	Jupiter	W.	97 37 33	99 20 6	101 2 19	102 44 14
	Pollux	W.	96 30 39	98 11 52	99 52 45	101 33 20
	Saturn	W.	62 47 54	64 29 50	66 11 28	67 52 47
	Regulus	W.	59 33 46	61 15 16	62 56 27	64 37 20
	Antares	E.	40 23 25	38 41 51	37 0 35	35 19 38
	Sun	E.	87 22 3	85 48 7	84 14 29	82 41 10
16	Jupiter	W.	111 9 17	112 49 26	114 29 17	116 8 52
	Saturn	W.	76 14 56	77 54 30	79 33 47	81 12 48
	Regulus	W.	72 57 16	74 36 23	76 15 14	77 53 48
	Spica	W.	19 4 18	20 42 19	22 20 12	23 57 57
	Sun	E.	74 59 5	73 27 32	71 56 16	70 25 16

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
9	α Arietis	W.	92 6 26	93 58 39	95 50 51	97 43 1
	Aldebaran	W.	60 14 48	62 5 6	63 55 27	65 45 50
	Spica	E.	74 0 38	72 8 12	70 15 47	68 23 24
	Mars	E.	99 3 13	97 15 54	95 28 35	93 41 18
10	Aldebaran	W.	74 57 27	76 47 33	78 37 32	80 27 23
	Jupiter	W.	32 36 33	34 29 24	36 22 7	38 14 41
	Pollux	W.	32 24 40	34 15 19	36 5 56	37 56 30
	Spica	E.	59 2 42	57 10 55	55 19 18	53 27 51
	Mars	E.	84 45 58	82 59 14	81 12 40	79 26 16
11	Aldebaran	W.	89 33 55	91 22 34	93 10 58	94 59 7
	Jupiter	W.	47 34 38	49 25 58	51 17 3	53 7 52
	Pollux	W.	47 7 25	48 57 6	50 46 34	52 35 49
	Spica	E.	44 13 47	42 23 42	40 33 53	38 44 21
	Mars	E.	70 37 20	68 52 15	67 7 26	65 22 54
	Sun	E.	133 23 20	131 40 40	129 58 14	128 16 4
12	Jupiter	W.	62 17 48	64 6 53	65 55 40	67 44 8
	Pollux	W.	61 38 12	63 25 51	65 13 12	67 0 15
	Saturn	W.	27 42 48	29 30 55	31 18 47	33 6 23
	Spica	E.	29 41 29	27 53 58	26 6 50	24 20 7
	Mars	E.	56 44 45	55 2 6	53 19 48	51 37 51
	Antares	E.	75 23 55	73 35 47	71 47 57	70 0 27
	Sun	E.	119 49 23	118 8 56	116 28 47	114 48 57
13	Jupiter	W.	76 41 35	78 28 5	80 14 15	82 0 4
	Pollux	W.	75 50 46	77 35 54	79 20 42	81 5 11
	Saturn	W.	41 59 51	43 45 38	45 31 5	47 16 12
	Regulus	W.	38 50 41	40 36 4	42 21 7	44 5 51
	Mars	E.	43 13 40	41 34 0	39 54 46	38 15 57
	Antares	E.	61 7 48	59 22 16	57 37 5	55 52 13
	Sun	E.	106 34 39	104 56 47	103 19 15	101 42 2
14	Jupiter	W.	90 44 10	92 28 0	94 11 31	95 54 41
	Pollux	W.	89 42 36	91 25 6	93 7 16	94 49 7
	Saturn	W.	55 57 1	57 40 13	59 23 5	61 5 39
	Regulus	W.	52 44 36	54 27 22	56 9 49	57 51 57
	Mars	E.	30 8 43	28 32 47	26 57 24	25 22 38
	Antares	E.	47 12 55	45 30 4	43 47 31	42 5 18
	Sun	E.	93 40 59	92 5 46	90 30 52	88 56 18
15	Jupiter	W.	104 25 50	106 7 8	107 48 8	109 28 51
	Pollux	W.	103 13 37	104 53 35	106 33 15	108 12 37
	Saturn	W.	69 33 48	71 14 31	72 54 57	74 35 5
	Regulus	W.	66 17 55	67 58 12	69 38 11	71 17 52
	Antares	E.	33 38 58	31 58 36	30 18 32	28 38 44
	Sun	E.	81 8 9	79 35 27	78 3 2	76 30 55
16	Jupiter	W.	117 48 10	119 27 12	121 5 58	122 44 28
	Saturn	W.	82 51 33	84 30 2	86 8 16	87 46 14
	Regulus	W.	79 32 6	81 10 7	82 47 53	84 25 24
	Spica	E.	25 35 33	27 12 58	28 50 12	30 27 15
	Sun	E.	68 54 33	67 24 5	65 53 53	64 23 57

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
17	Saturn	W.	89 23 57	91 1 25	92 38 40	94 15 40
	Regulus	W.	86 2 40	87 39 41	89 16 28	90 53 0
	Spica	W.	32 4 6	33 40 45	35 17 11	36 53 25
	Sun	E.	62 54 15	61 24 49	59 55 36	58 26 38
18	Saturn	W.	102 17 18	103 52 59	105 28 27	107 3 43
	Spica	W.	44 51 31	46 26 33	48 1 23	49 36 2
	Mars	W.	15 36 32	17 0 33	18 25 24	19 50 51
	Sun	E.	51 5 11	49 37 33	48 10 6	46 42 52
19	Spica	W.	57 26 31	59 0 6	60 33 30	62 6 45
	Mars	W.	27 2 52	28 29 41	29 56 34	31 23 27
	Sun	E.	39 29 33	38 3 26	36 37 30	35 11 43
25	Sun	W.	27 1 32	28 22 35	29 43 37	31 4 37
	a Arietis	E.	64 0 51	62 32 33	61 4 17	59 36 3
	Aldebaran	E.	96 13 2	94 45 47	93 18 33	91 51 19
26	Sun	W.	37 49 33	39 10 33	40 31 35	41 52 38
	a Arietis	E.	52 15 13	50 47 5	49 18 58	47 50 50
	Aldebaran	E.	84 35 21	83 8 10	81 40 58	80 13 45
27	Sun	W.	48 38 28	49 59 48	51 21 13	52 42 42
	Venus	W.	19 59 36	21 18 3	22 36 41	23 55 30
	a Arietis	E.	40 30 5	39 1 53	37 33 40	36 5 25
	Aldebaran	E.	72 57 21	71 29 58	70 2 33	68 35 5
	Jupiter	E.	112 38 57	111 9 9	109 39 18	108 9 22
28	Sun	W.	59 31 36	60 53 44	62 16 0	63 38 24
	Venus	W.	30 32 16	31 52 8	33 12 11	34 32 24
	Aldebaran	E.	61 16 52	59 49 2	58 21 7	56 53 7
	Jupiter	E.	100 38 13	99 7 38	97 36 56	96 6 6
	Pollux	E.	103 20 49	101 51 26	100 21 55	98 52 15
29	Sun	W.	70 32 56	71 56 24	73 20 4	74 43 57
	Venus	W.	41 16 25	42 37 50	43 59 29	45 21 21
	Aldebaran	E.	49 31 55	48 3 26	46 34 52	45 6 14
	Jupiter	E.	88 29 25	86 57 31	85 25 25	83 53 7
	Pollux	E.	91 21 25	89 50 42	88 19 46	86 48 37
30	Sun	W.	81 46 59	83 12 22	84 38 2	86 4 0
	Venus	W.	52 14 29	53 37 55	55 1 38	56 25 39
	a Pegasi	W.	41 31 7	42 55 58	44 21 31	45 47 46
	Aldebaran	E.	37 42 17	36 13 25	34 44 36	33 15 51
	Jupiter	E.	76 8 3	74 34 15	73 0 11	71 25 51
	Pollux	E.	79 9 22	77 36 45	76 3 51	74 30 40
	Saturn	E.	111 47 16	110 13 49	108 40 5	107 6 4
31	Sun	W.	93 18 28	94 46 22	96 14 38	97 43 15
	Venus	W.	63 30 30	64 56 29	66 22 50	67 49 33
	a Pegasi	W.	53 8 7	54 37 55	56 8 16	57 39 10
	Jupiter	E.	63 29 26	61 53 9	60 16 32	58 39 33
	Pollux	E.	66 40 12	65 5 8	63 29 43	61 53 58
	Saturn	E.	99 11 15	97 35 17	95 58 58	94 22 17

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVʰ.	XVIIIʰ.	XXIʰ.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
17	Saturn	W.	95 52 26	97 28 59	99 5 18	100 41 25
	Regulus	W.	92 29 19	94 5 24	95 41 15	97 16 53
	Spica	W.	38 29 26	40 5 15	41 40 52	43 16 17
	Sun	E.	56 57 54	55 29 24	54 1 6	52 33 2
18	Saturn	W.	108 38 47	110 13 39	111 48 20	113 22 52
	Spica	W.	51 10 29	52 44 46	54 18 52	55 52 47
	Mars	W.	21 16 46	22 43 0	24 9 29	25 36 7
	Sun	E.	45 15 50	43 48 59	42 22 19	40 55 51
19	Spica	W.	63 39 50	65 12 45	66 45 31	68 18 8
	Mars	W.	32 50 19	34 17 10	35 43 59	37 10 45
	Sun	E.	33 46 7	32 20 41	30 55 24	29 30 17
25	Sun	W.	32 25 37	33 46 36	35 7 35	36 28 34
	α Arietis	E.	58 7 51	56 39 40	55 11 30	53 43 21
	Aldebaran	E.	90 24 7	88 56 55	87 29 43	86 2 32
26	Sun	W.	43 13 43	44 34 50	45 55 59	47 17 12
	α Arietis	E.	46 22 43	44 54 35	43 26 26	41 58 16
	Aldebaran	E.	78 46 31	77 19 16	75 51 59	74 24 41
27	Sun	W.	54 4 16	55 25 56	56 47 42	58 9 35
	Venus	W.	25 14 30	26 33 41	27 53 3	29 12 34
	α Arietis	E.	34 37 8	33 8 49	31 40 30	30 12 10
	Aldebaran	E.	67 7 34	65 39 59	64 12 21	62 44 39
	Jupiter	E.	106 39 20	105 9 13	103 39 0	102 8 40
28	Sun	W.	65 0 58	66 23 42	67 46 36	69 9 40
	Venus	W.	35 52 49	37 13 25	38 34 12	39 55 12
	Aldebaran	E.	55 25 3	53 56 53	52 28 38	51 0 19
	Jupiter	E.	94 35 6	93 3 56	91 32 36	90 1 6
	Pollux	E.	97 22 26	95 52 26	94 22 16	92 51 56
29	Sun	W.	76 8 4	77 32 25	78 57 1	80 21 52
	Venus	W.	46 43 28	48 5 50	49 28 27	50 51 20
	Aldebaran	E.	43 37 32	42 8 47	40 39 58	39 11 8
	Jupiter	E.	82 20 36	80 47 50	79 14 49	77 41 34
	Pollux	E.	85 17 15	83 45 39	82 13 49	80 41 43
30	Sun	W.	87 30 15	88 56 49	90 23 42	91 50 55
	Venus	W.	57 49 58	59 14 37	60 39 35	62 4 52
	α Pegasi	W.	47 14 38	48 42 7	50 10 12	51 38 53
	Aldebaran	E.	31 47 14	30 18 47	28 50 33	27 22 33
	Jupiter	E.	69 51 12	68 16 14	66 40 58	65 5 22
	Pollux	E.	72 57 12	71 23 26	69 49 21	68 14 56
	Saturn	E.	105 31 45	103 57 7	102 22 9	100 46 52
31	Sun	W.	99 12 14	100 41 36	102 11 22	103 41 31
	Venus	W.	69 16 38	70 44 6	72 11 57	73 40 12
	α Pegasi	W.	59 10 35	60 42 31	62 14 59	63 47 59
	Jupiter	E.	57 2 12	55 24 29	53 46 23	52 7 53
	Pollux	E.	60 17 51	58 41 22	57 4 31	55 27 18
	Saturn	E.	92 45 13	91 7 47	89 29 57	87 51 44

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIʰ.	VIʰ.	IXʰ.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Sun	W.	105 12 4	106 43 2	108 14 25	109 46 13
	Venus	W.	75 8 52	76 37 57	78 7 26	79 37 20
	α Pegasi	W.	65 21 27	66 55 28	68 29 58	70 4 58
	α Arietis	W.	21 49 30	23 25 50	25 2 49	26 40 26
	Jupiter	E.	50 28 59	48 49 41	47 9 59	45 29 52
	Pollux	E.	53 49 42	52 11 43	50 33 20	48 54 35
	Saturn	E.	86 13 7	84 34 5	82 54 38	81 14 46
	Regulus	E.	90 40 17	89 1 47	87 22 54	85 43 35
2	Sun	W.	117 31 46	119 6 12	120 41 6	122 16 27
	Venus	W.	87 13 20	88 45 53	90 18 52	91 52 19
	α Pegasi	W.	78 7 23	79 45 20	81 23 45	83 2 39
	α Arietis	W.	34 57 15	36 38 17	38 19 49	40 1 53
	Jupiter	E.	37 2 53	35 20 11	33 37 3	31 53 29
	Pollux	E.	40 34 51	38 53 43	37 12 15	35 30 20
	Saturn	E.	72 48 55	71 6 25	69 23 27	67 40 2
	Regulus	E.	77 20 30	75 38 32	73 56 9	72 13 17
3	Sun	W.	130 20 6	131 58 13	133 36 47	135 15 48
	Venus	W.	99 46 19	101 22 29	102 59 6	104 36 9
	α Pegasi	W.	91 24 4	93 5 41	94 47 43	96 30 10
	α Arietis	W.	48 39 48	50 24 53	52 10 25	53 56 26
	Aldebaran	W.	18 59 8	20 29 4	22 1 40	23 36 27
	Pollux	E.	26 55 57	25 12 15	23 28 22	21 44 24
	Saturn	E.	58 56 11	57 10 3	55 23 28	53 36 26
	Regulus	E.	63 32 7	61 46 31	60 0 28	58 13 59
4	Venus	W.	112 47 52	114 27 27	116 7 26	117 47 47
	α Pegasi	W.	105 8 6	106 52 44	108 37 39	110 22 50
	α Arietis	W.	62 53 25	64 42 8	66 31 15	68 20 47
	Aldebaran	W.	31 54 24	33 37 32	35 21 37	37 6 32
	Saturn	E.	44 34 53	42 45 20	40 55 24	39 5 6
	Regulus	E.	49 15 0	47 25 57	45 36 31	43 46 42
	Spica	E.	103 17 54	101 28 54	99 39 29	97 49 40
5	α Arietis	W.	77 34 3	79 25 44	81 17 43	83 10 0
	Aldebaran	W.	46 1 28	47 50 12	49 39 24	51 29 3
	Saturn	E.	29 48 27	27 56 14	26 3 47	24 11 7
	Regulus	E.	34 32 14	32 40 23	30 48 15	28 55 52
	Spica	E.	88 35 6	86 43 11	84 50 57	82 58 27
6	α Arietis	W.	92 35 1	94 28 37	96 22 22	98 16 15
	Aldebaran	W.	60 42 50	62 34 29	64 26 22	66 18 27
	Jupiter	W.	21 23 47	23 18 8	25 12 42	27 7 26
	Pollux	W.	18 12 39	20 2 47	21 53 40	23 45 11
	Spica	E.	73 32 20	71 38 31	69 44 33	67 50 27
	Mars	E.	115 18 34	113 29 44	111 40 44	109 51 34
7	Aldebaran	W.	75 40 56	77 33 39	79 26 23	81 19 7
	Jupiter	W.	36 42 47	38 38 0	40 33 13	42 28 24
	Pollux	W.	33 8 28	35 1 48	36 55 14	38 48 43
	Spica	E.	58 18 46	56 24 21	54 29 57	52 35 36
	Mars	E.	100 44 17	98 54 42	97 5 7	95 15 34
	Antares	E.	104 6 16	102 11 39	100 17 2	98 22 27

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Sun	W.	111 18 27	112 51 7	114 24 13	115 57 46
	Venus	W.	81 7 39	82 38 25	84 9 37	85 41 15
	α Pegasi	W.	71 40 27	73 16 27	74 52 57	76 29 55
	α Arietis	W.	28 18 39	29 57 27	31 36 49	33 16 46
	Jupiter	E.	43 49 20	42 8 22	40 26 58	38 45 9
	Pollux	E.	47 15 25	45 35 52	43 55 55	42 15 35
	Saturn	E.	79 34 28	77 53 44	76 12 34	74 30 58
	Regulus	E.	84 3 50	82 23 40	80 43 3	79 2 0
2	Sun	W.	123 52 16	125 28 32	127 5 16	128 42 27
	Venus	W.	93 26 12	95 0 33	96 35 21	98 10 37
	α Pegasi	W.	84 42 1	86 21 51	88 2 9	89 42 53
	α Arietis	W.	41 44 28	43 27 33	45 11 8	46 55 13
	Jupiter	E.	30 9 28	28 25 2	26 40 10	24 54 52
	Pollux	E.	33 48 6	32 5 31	30 22 37	28 39 25
	Saturn	E.	65 56 10	64 11 51	62 27 5	60 41 52
	Regulus	E.	70 29 57	68 46 10	67 1 56	65 17 15
3	Sun	W.	136 55 15	138 35 8	140 15 28	141 56 13
	Venus	W.	106 13 38	107 51 33	109 29 54	111 8 41
	α Pegasi	W.	98 13 1	99 56 15	101 39 51	103 23 48
	α Arietis	W.	55 42 55	57 29 52	59 17 17	61 5 8
	Aldebaran	W.	25 13 10	26 51 29	28 31 15	30 12 15
	Pollux	E.	20 0 27	18 16 41	16 33 18	14 50 28
	Saturn	E.	51 48 59	50 1 5	48 12 46	46 24 2
	Regulus	E.	56 27 3	54 39 41	52 51 53	51 3 39
4	Venus	W.	119 28 31	121 9 36	122 51 1	124 32 46
	α Pegasi	W.	112 8 17	113 53 58	115 39 50	117 25 52
	α Arietis	W.	70 10 42	72 1 0	73 51 40	75 42 41
	Aldebaran	W.	38 52 13	40 38 36	42 25 38	44 13 16
	Saturn	E.	37 14 25	35 23 24	33 32 4	31 40 24
	Regulus	E.	41 56 29	40 5 55	38 15 1	36 23 47
	Spica	E.	95 59 28	94 8 54	92 17 58	90 26 42
5	α Arietis	W.	85 2 32	86 55 20	88 48 21	90 41 35
	Aldebaran	W.	53 19 7	55 9 33	57 0 20	58 51 27
	Saturn	E.	22 18 16	20 25 19	18 32 17	16 39 14
	Regulus	E.	27 3 15	25 10 26	23 17 26	21 24 17
	Spica	E.	81 5 41	79 12 40	77 19 25	75 25 58
6	α Arietis	W.	100 10 15	102 4 19	103 58 28	105 52 39
	Aldebaran	W.	68 10 43	70 3 7	71 55 38	73 48 15
	Jupiter	W.	29 2 19	30 57 19	32 52 25	34 47 35
	Pollux	W.	25 37 12	27 29 37	29 22 20	31 15 18
	Spica	E.	65 56 14	64 1 57	62 7 36	60 13 11
	Mars	E.	108 2 16	106 12 52	104 23 23	102 33 51
7	Aldebaran	W.	83 11 48	85 4 25	86 56 57	88 49 22
	Jupiter	W.	44 23 32	46 18 36	48 13 34	50 8 25
	Pollux	W.	40 42 13	42 35 44	44 29 12	46 22 37
	Spica	E.	50 41 20	48 47 9	46 53 4	44 59 9
	Mars	E.	93 26 3	91 36 37	89 47 17	87 58 5
	Antares	E.	96 27 56	94 33 29	92 39 9	90 44 55

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
8	Aldebaran	W.	90 41 39	92 33 46	94 25 42	96 17 26
	Jupiter	W.	52 3 8	53 57 41	55 52 4	57 46 15
	Pollux	W.	48 15 57	50 9 10	52 2 14	53 55 9
	Saturn	W.	16 17 11	18 10 31	20 3 51	21 57 10
	Spica	E.	43 5 23	41 11 48	39 18 25	37 25 16
	Mars	E.	86 9 1	84 20 6	82 31 22	80 42 49
	Antares	E.	88 50 50	86 56 55	85 3 10	83 9 37
9	Jupiter	W.	67 13 36	69 6 15	70 58 35	72 50 36
	Pollux	W.	63 16 32	65 8 3	66 59 16	68 50 11
	Saturn	W.	31 21 40	33 13 54	35 5 52	36 57 33
	Regulus	W.	26 14 51	28 6 32	29 57 57	31 49 4
	Spica	E.	28 3 43	26 12 26	24 21 33	22 31 7
	Mars	E.	71 43 43	69 56 45	68 10 6	66 23 46
	Antares	E.	73 45 27	71 53 27	70 1 45	68 10 23
10	Jupiter	W.	82 5 23	83 55 13	85 44 40	87 33 42
	Pollux	W.	77 59 39	79 48 27	81 36 52	83 24 53
	Saturn	W.	46 11 1	48 0 39	49 49 54	51 38 46
	Regulus	W.	40 59 44	42 48 47	44 37 27	46 25 44
	Mars	E.	57 37 35	55 53 32	54 9 53	52 26 39
	Antares	E.	58 58 44	57 9 32	55 20 43	53 32 18
	Sun	E.	132 14 24	130 32 45	128 51 30	127 10 39
11	Jupiter	W.	96 32 40	98 19 12	100 5 18	101 50 58
	Saturn	W.	60 36 58	62 23 24	64 9 21	65 54 55
	Regulus	W.	55 21 7	57 6 57	58 52 22	60 37 22
	Mars	E.	43 57 12	42 16 41	40 36 40	38 57 7
	Antares	E.	44 36 25	42 50 30	41 5 0	39 19 55
	Sun	E.	118 52 34	117 14 12	115 36 16	113 58 46
12	Saturn	W.	74 36 27	76 19 30	78 2 8	79 44 22
	Regulus	W.	69 16 0	70 58 29	72 40 33	74 22 12
	Spica	W.	15 26 6	17 6 54	18 47 36	20 28 7
	Antares	E.	30 40 54	28 58 22	27 16 14	25 34 31
	Mars	E.	30 47 4	29 10 40	27 34 52	25 59 40
	Sun	E.	105 57 33	104 22 34	102 48 0	101 13 51
13	Saturn	W.	88 9 33	89 49 26	91 28 56	93 8 3
	Regulus	W.	82 44 30	84 23 48	86 2 44	87 41 18
	Spica	W.	28 46 47	30 25 36	32 4 6	33 42 17
	Sun	E.	93 29 3	91 57 16	90 25 51	88 54 48
14	Saturn	W.	101 18 27	102 55 31	104 32 16	106 8 41
	Regulus	W.	95 48 48	97 25 18	99 1 28	100 37 21
	Spica	W.	41 48 21	43 24 37	45 0 35	46 36 16
	Sun	E.	81 24 49	79 55 50	78 23 10	76 58 49
15	Saturn	W.	114 6 30	115 41 14	117 15 42	118 49 54
	Spica	W.	54 30 25	56 4 27	57 38 14	59 11 46
	Sun	E.	69 41 27	68 14 48	66 48 25	65 22 17
16	Spica	W.	66 56 4	68 28 17	70 0 19	71 32 9
	Antares	W.	21 3 51	22 36 13	24 8 23	25 40 22
	Mars	W.	19 40 36	21 5 25	22 30 25	23 55 33

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
8	Aldebaran	W.	98 8 57	100 0 13	101 51 12	103 41 54
	Jupiter	W.	59 40 13	61 33 57	63 27 26	65 20 40
	Pollux	W.	55 47 53	57 40 24	59 32 42	61 24 45
	Saturn	W.	23 50 24	25 43 30	27 36 26	29 29 10
	Spica	E.	35 32 22	33 39 44	31 47 24	29 55 23
	Mars	E.	78 54 29	77 6 23	75 18 33	73 30 59
	Antares	E.	81 16 17	79 23 11	77 30 20	75 37 45
9	Jupiter	W.	74 42 16	76 33 35	78 24 34	80 15 10
	Pollux	W.	70 40 46	72 31 1	74 20 55	76 10 28
	Saturn	W.	38 48 55	40 39 57	42 30 39	44 21 1
	Regulus	W.	33 39 52	35 30 21	37 20 30	39 10 18
	Spica	E.	20 41 10	18 51 46	17 2 58	15 14 54
	Mars	E.	64 37 47	62 52 10	61 6 55	59 22 3
	Antares	E.	66 19 20	64 28 38	62 38 18	60 48 20
10	Jupiter	W.	89 22 19	91 10 32	92 58 20	94 45 43
	Pollux	W.	85 12 30	86 59 42	88 46 30	90 32 54
	Saturn	W.	53 27 13	55 15 15	57 2 54	58 50 9
	Regulus	W.	48 13 38	50 1 7	51 48 12	53 34 52
	Mars	E.	50 43 52	49 1 31	47 19 36	45 38 10
	Antares	E.	51 44 18	49 56 42	48 9 32	46 22 46
	Sun	E.	125 30 13	123 50 11	122 10 34	120 31 21
11	Jupiter	W.	103 36 13	105 21 2	107 5 26	108 49 25
	Saturn	W.	67 40 4	69 24 47	71 9 5	72 52 59
	Regulus	W.	62 21 56	64 6 4	65 49 48	67 33 7
	Mars	E.	37 18 4	35 39 32	34 1 31	32 24 1
	Antares	E.	37 35 16	35 51 2	34 7 14	32 23 52
	Sun	E.	112 21 41	110 45 1	109 8 46	107 32 57
12	Saturn	W.	81 26 12	83 7 38	84 48 40	86 29 18
	Regulus	W.	76 3 27	77 44 18	79 24 45	81 4 49
	Spica	W.	22 8 25	23 48 27	25 28 12	27 7 39
	Antares	E.	23 53 12	22 12 18	20 31 47	18 51 40
	Mars	E.	24 25 6	22 51 14	21 18 6	19 45 47
	Sun	E.	99 40 6	98 6 45	96 33 48	95 1 14
13	Saturn	W.	94 46 50	96 25 15	98 3 19	99 41 3
	Regulus	W.	89 19 30	90 57 20	92 34 49	94 11 59
	Spica	W.	35 20 8	36 57 39	38 34 52	40 11 46
	Sun	E.	87 24 6	85 53 46	84 23 47	82 54 8
14	Saturn	W.	107 44 49	109 20 40	110 56 14	112 31 30
	Regulus	W.	102 12 54	103 48 10	105 23 8	106 57 50
	Spica	W.	48 11 39	49 46 45	51 21 34	52 56 8
	Sun	E.	75 30 46	74 3 1	72 35 33	71 8 22
15	Saturn	W.	120 23 52	121 57 35	123 31 5	125 4 21
	Spica	W.	60 45 5	62 18 10	63 51 1	65 23 39
	Sun	E.	63 56 24	62 30 45	61 5 20	59 40 8
16	Spica	W.	73 3 49	74 35 19	76 6 39	77 37 48
	Antares	W.	27 12 10	28 43 47	30 15 14	31 46 31
	Mars	W.	25 20 46	26 46 1	28 11 18	29 36 34

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
16	Sun	E.	58° 15′ 8″	56° 50′ 21″	55° 25′ 46″	54° 1′ 23″
17	Spica	W.	79 8 48	80 39 39	82 10 21	83 40 55
	Antares	W.	33 17 38	34 48 39	36 19 27	37 50 8
	Mars	W.	31 1 49	32 27 2	33 52 13	35 17 21
	Sun	E.	47 2 8	45 38 46	44 15 33	42 52 29
18	Spica	W.	91 11 55	92 41 47	94 11 33	95 41 13
	Antares	W.	45 21 43	46 51 42	48 21 34	49 51 21
	Mars	W.	42 22 10	43 46 57	45 11 41	46 36 21
	Sun	E.	35 59 6	34 36 47	33 14 34	31 52 28
23	Sun	W.	18 29 59	19 51 11	21 12 24	22 33 41
	Aldebaran	E.	75 56 42	74 29 10	73 1 36	71 34 0
	Jupiter	E.	113 14 46	111 45 23	110 15 58	108 46 30
24	Sun	W.	29 21 15	30 43 5	32 5 0	33 27 1
	Aldebaran	E.	64 15 35	62 47 48	61 19 59	59 52 8
	Jupiter	E.	101 18 15	99 48 23	98 18 27	96 48 26
	Pollux	E.	106 23 21	104 54 9	103 24 54	101 55 33
25	Sun	W.	40 18 42	41 41 23	43 4 13	44 27 11
	Aldebaran	E.	52 32 23	51 4 21	49 36 17	48 8 13
	Jupiter	E.	89 16 52	87 46 13	86 15 28	84 44 36
	Pollux	E.	94 27 13	92 57 13	91 27 5	89 56 50
	Saturn	E.	125 3 15	123 32 27	122 1 32	120 30 29
26	Sun	W.	51 24 13	52 48 7	54 12 11	55 36 27
	Venus	W.	16 34 18	17 53 9	19 12 39	20 32 43
	Aldebaran	E.	40 47 47	39 19 46	37 51 48	36 23 56
	Jupiter	E.	77 8 3	75 36 16	74 4 19	72 32 11
	Pollux	E.	82 23 23	80 52 13	79 20 53	77 49 23
	Saturn	E.	112 53 1	111 21 1	109 48 52	108 16 32
27	Sun	W.	62 40 44	64 6 15	65 31 59	66 57 58
	Venus	W.	27 19 52	28 42 28	30 5 25	31 28 42
	Jupiter	E.	64 48 37	63 15 16	61 41 42	60 7 54
	Pollux	E.	70 8 57	68 36 14	67 3 18	65 30 8
	Saturn	E.	100 31 50	98 58 15	97 24 26	95 50 23
	Regulus	E.	107 3 22	105 30 19	103 57 3	102 23 32
28	Sun	W.	74 11 47	75 39 23	77 7 16	78 35 27
	Venus	W.	38 30 13	39 55 31	41 21 11	42 47 10
	Jupiter	E.	52 15 2	50 39 38	49 3 58	47 28 1
	Pollux	E.	57 40 37	56 5 56	54 30 59	52 55 45
	Saturn	E.	87 56 13	86 20 32	84 44 35	83 8 20
	Regulus	E.	94 32 4	92 56 56	91 21 31	89 45 48
29	Sun	W.	86 1 11	87 31 21	89 1 51	90 32 43
	Venus	W.	50 2 25	51 30 34	52 59 5	54 27 59
	a Arietis	W.	30 39 17	32 15 48	33 52 46	35 30 11
	Jupiter	E.	39 23 33	37 45 40	36 7 27	34 28 53
	Pollux	E.	44 55 12	43 18 12	41 40 53	40 3 16
	Saturn	E.	75 2 17	73 24 4	71 45 30	70 6 34
	Regulus	E.	81 42 24	80 4 42	78 26 40	76 48 16

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
16	Sun	E.	52 37 11	51 13 10	49 49 19	48 25 39
17	Spica	W.	85 11 21	86 41 41	88 11 53	89 41 57
	Antares	W.	39 20 42	40 51 8	42 21 27	43 51 38
	Mars	W.	36 42 26	38 7 27	39 32 25	40 57 19
	Sun	E.	41 29 33	40 6 45	38 44 5	37 21 32
18	Spica	W.	97 10 47	98 40 16	100 9 41	101 39 1
	Antares	W.	51 21 3	52 50 39	54 20 11	55 49 38
	Mars	W.	48 0 58	49 25 32	50 50 3	52 14 30
	Sun	E.	30 30 29	29 8 35	27 46 47	26 25 4
23	Sun	W.	23 55 1	25 16 26	26 37 56	27 59 32
	Aldebaran	E.	70 6 23	68 38 44	67 11 3	65 43 20
	Jupiter	E.	107 16 58	105 47 23	104 17 44	102 48 1
24	Sun	W.	34 49 8	36 11 21	37 33 41	38 56 8
	Aldebaran	E.	58 24 15	56 56 20	55 28 23	54 0 24
	Jupiter	E.	95 18 19	93 48 7	92 17 48	90 47 23
	Pollux	E.	100 26 5	98 56 31	97 26 52	95 57 6
25	Sun	W.	45 50 17	47 13 32	48 36 56	50 0 29
	Aldebaran	E.	46 40 7	45 12 0	43 43 54	42 15 50
	Jupiter	E.	83 13 35	81 42 25	80 11 7	78 39 40
	Pollux	E.	88 26 20	86 55 54	85 25 13	83 54 23
	Saturn	E.	118 59 18	117 27 58	115 56 29	114 24 50
26	Sun	W.	57 0 54	58 25 33	59 50 24	61 15 27
	Venus	W.	21 53 17	23 14 19	24 35 47	25 57 38
	Aldebaran	E.	34 56 11	33 28 34	32 1 8	30 33 57
	Jupiter	E.	70 59 52	69 27 22	67 54 40	66 21 45
	Pollux	E.	76 17 42	74 45 48	73 13 43	71 41 26
	Saturn	E.	106 44 0	105 11 17	103 38 21	102 5 12
27	Sun	W.	68 24 12	69 50 42	71 17 27	72 44 28
	Venus	W.	32 52 20	34 16 18	35 40 36	37 5 15
	Jupiter	E.	58 33 51	56 59 32	55 24 58	53 50 8
	Pollux	E.	63 56 44	62 23 5	60 49 11	59 15 2
	Saturn	E.	94 16 4	92 41 30	91 6 41	89 31 36
	Regulus	E.	100 49 46	99 15 45	97 41 28	96 6 55
28	Sun	W.	80 3 57	81 32 46	83 1 54	84 31 22
	Venus	W.	44 13 30	45 40 11	47 7 14	48 34 39
	Jupiter	E.	45 51 45	44 15 11	42 38 18	41 1 5
	Pollux	E.	51 20 14	49 44 25	48 8 18	46 31 54
	Saturn	E.	81 31 47	79 54 53	78 17 41	76 40 9
	Regulus	E.	88 9 47	86 33 26	84 56 45	83 19 45
29	Sun	W.	92 3 57	93 35 34	95 7 33	96 39 55
	Venus	W.	55 57 16	57 26 57	58 57 1	60 27 30
	α Arietis	W.	37 8 2	38 46 20	40 25 5	42 4 16
	Jupiter	E.	32 49 59	31 10 43	29 31 6	27 51 7
	Pollux	E.	38 25 20	36 47 6	35 8 35	33 29 46
	Saturn	E.	68 27 17	66 47 37	65 7 35	63 27 9
	Regulus	E.	75 9 30	73 30 21	71 50 49	70 10 55

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Sun	W.	98 12 40	99 45 49	101 19 23	102 53 21
	Venus	W.	61 58 23	63 29 40	65 1 22	66 33 30
	α Arietis	W.	43 43 53	45 23 56	47 4 26	48 45 22
	Jupiter	E.	26 10 45	24 30 3	22 48 59	21 7 34
	Saturn	E.	61 46 22	60 5 9	58 23 33	56 41 33
	Regulus	E.	68 30 37	66 49 56	65 8 51	63 27 22
2	Sun	W.	110 49 19	112 25 47	114 2 40	115 39 58
	Venus	W.	74 20 27	75 55 8	77 30 14	79 5 47
	α Arietis	W.	57 16 40	59 0 16	60 44 18	62 28 46
	Aldebaran	W.	26 37 15	28 13 27	29 50 51	31 29 21
	Saturn	E.	48 5 27	46 20 59	44 36 6	42 50 48
	Regulus	E.	54 53 42	53 9 43	51 25 18	49 40 28
3	Sun	W.	123 52 43	125 32 30	127 12 41	128 53 16
	Venus	W.	87 9 56	88 48 2	90 26 33	92 5 29
	α Arietis	W.	71 17 40	73 4 44	74 52 14	76 40 9
	Aldebaran	W.	39 55 26	41 38 57	43 23 8	45 7 56
	Saturn	E.	33 58 11	32 10 28	30 22 23	28 33 56
	Regulus	E.	40 50 2	39 2 43	37 14 59	35 26 52
4	Venus	W.	100 26 0	102 7 13	103 48 47	105 30 41
	α Arietis	W.	85 45 36	87 35 48	89 26 22	91 17 17
	Aldebaran	W.	54 0 27	55 48 28	57 36 57	59 25 51
	Jupiter	W.	16 17 2	18 7 8	19 57 42	21 48 41
	Spica	E.	80 23 11	78 32 43	76 41 55	74 50 47
5	Aldebaran	W.	68 36 5	70 27 8	72 18 27	74 10 2
	Jupiter	W.	31 9 0	33 1 58	34 55 11	36 48 38
	Pollux	W.	26 3 4	27 54 4	29 45 33	31 37 26
	Spica	E.	65 30 31	63 37 39	61 44 33	59 51 14
	Antares	E.	111 18 43	109 25 40	107 32 23	105 38 53
6	Aldebaran	W.	83 30 59	85 23 37	87 16 21	89 9 8
	Jupiter	W.	46 18 44	48 13 9	50 7 39	52 2 13
	Pollux	W.	41 1 31	42 54 59	44 48 37	46 42 22
	Spica	E.	50 22 9	48 27 58	46 33 44	44 39 27
	Antares	E.	96 8 45	94 14 20	92 19 49	90 25 15
	Mars	E.	109 12 38	107 22 50	105 32 57	103 43 0
7	Jupiter	W.	61 35 19	63 29 50	65 24 16	67 18 35
	Pollux	W.	56 11 56	58 5 51	59 59 41	61 53 27
	Saturn	W.	26 20 0	28 14 33	30 9 4	32 3 32
	Spica	E.	35 8 10	33 14 7	31 20 12	29 26 27
	Antares	E.	80 52 11	78 57 41	77 3 16	75 8 58
	Mars	E.	94 32 51	92 42 54	90 53 3	89 3 18
8	Jupiter	W.	76 47 51	78 41 6	80 34 6	82 26 51
	Pollux	W.	71 20 11	73 12 58	75 5 31	76 57 49
	Saturn	W.	41 33 57	43 27 29	45 20 48	47 13 52
	Regulus	W.	34 19 20	36 12 23	38 5 12	39 57 46
	Antares	E.	65 39 43	63 46 28	61 53 28	60 0 44
	Mars	E.	79 56 47	78 8 5	76 19 37	74 31 25
9	Jupiter	W.	91 46 0	93 36 49	95 27 17	97 17 22

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Sun	W.	104 27 43	106 2 29	107 37 40	109 13 17
	Venus	W.	68 6 2	69 39 0	71 12 23	72 46 12
	α Arietis	W.	50 26 44	52 8 33	53 50 49	55 33 31
	Jupiter	E.	19 25 49	17 43 45	16 1 23	14 18 44
	Saturn	E.	54 59 10	53 16 21	51 33 8	49 49 30
	Regulus	E.	61 45 28	60 3 9	58 20 25	56 37 16
2	Sun	W.	117 17 40	118 55 49	120 34 22	122 13 20
	Venus	W.	80 41 45	82 18 10	83 55 0	85 32 15
	α Arietis	W.	64 13 40	65 59 1	67 44 49	69 31 2
	Aldebaran	W.	33 8 52	34 49 18	36 30 34	38 12 38
	Saturn	E.	41 5 5	39 18 57	37 32 26	35 45 31
	Regulus	E.	47 55 13	46 9 32	44 23 26	42 36 56
3	Sun	W.	130 34 14	132 15 35	133 57 19	135 39 25
	Venus	W.	93 44 49	95 24 32	97 4 39	98 45 8
	α Arietis	W.	78 28 28	80 17 10	82 6 16	83 55 45
	Aldebaran	W.	46 53 20	48 39 19	50 25 51	52 12 54
	Saturn	E.	26 45 7	24 55 58	23 6 31	21 16 46
	Regulus	E.	33 38 22	31 49 30	30 0 16	28 10 40
4	Venus	W.	107 12 54	108 55 26	110 38 15	112 21 21
	α Arietis	W.	93 8 31	95 0 4	96 51 55	98 44 2
	Aldebaran	W.	61 15 10	63 4 53	64 54 57	66 45 21
	Jupiter	W.	23 40 4	25 31 49	27 23 54	29 16 18
	Spica	E.	72 59 19	71 7 33	69 15 29	67 23 8
5	Aldebaran	W.	76 1 51	77 53 53	79 46 6	81 38 29
	Jupiter	W.	38 42 18	40 36 10	42 30 13	44 24 25
	Pollux	W.	33 29 41	35 22 16	37 15 7	39 8 13
	Spica	E.	57 57 44	56 4 3	54 10 13	52 16 14
	Antares	E.	103 45 11	101 51 18	99 57 15	98 3 4
6	Aldebaran	W.	91 1 58	92 54 50	94 47 41	96 40 29
	Jupiter	W.	53 56 50	55 51 29	57 46 7	59 40 44
	Pollux	W.	48 36 12	50 30 6	52 24 3	54 18 0
	Spica	E.	42 45 8	40 50 49	38 56 32	37 2 19
	Antares	E.	88 30 38	86 36 0	84 41 22	82 46 45
	Mars	E.	101 52 59	100 2 56	98 12 53	96 22 51
7	Jupiter	W.	69 12 47	71 6 50	73 0 42	74 54 23
	Pollux	W.	63 45 7	65 40 37	67 33 59	69 27 11
	Saturn	W.	33 57 54	35 52 9	37 46 15	39 40 12
	Spica	E.	27 32 54	25 39 35	23 46 32	21 53 48
	Antares	E.	73 14 47	71 20 45	69 26 53	67 33 12
	Mars	E.	87 13 40	85 24 10	83 34 51	81 45 43
8	Jupiter	W.	84 19 18	86 11 28	88 3 19	89 54 49
	Pollux	W.	78 49 50	80 41 34	82 33 0	84 24 7
	Saturn	W.	49 6 39	50 59 9	52 51 21	54 43 14
	Regulus	W.	41 50 5	43 42 6	45 33 49	47 25 13
	Antares	E.	58 8 16	56 16 6	54 24 15	52 32 43
	Mars	E.	72 43 29	70 55 52	69 8 33	67 21 35
9	Jupiter	W.	99 7 3	100 56 20	102 45 12	104 33 39

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
9	Pollux	W.	86 14 54	88 5 19	89 55 23	91 45 5
	Saturn	W.	56 34 47	58 25 59	60 16 50	62 7 18
	Regulus	W.	49 16 17	51 7 1	52 57 23	54 47 23
	Antares	E.	50 41 31	48 50 40	47 0 11	45 10 5
	Mars	E.	65 34 56	63 48 39	62 2 45	60 17 14
	α Aquilæ	E.	103 31 35	101 56 33	100 21 39	98 46 54
10	Jupiter	W.	106 21 40	108 9 15	109 56 24	111 43 7
	Pollux	W.	100 47 30	102 34 43	104 21 30	106 7 50
	Saturn	W.	71 13 41	73 1 42	74 49 18	76 36 27
	Regulus	W.	63 51 25	65 38 59	67 26 6	69 12 47
	Antares	E.	36 5 38	34 18 1	32 30 49	30 44 3
	Mars	E.	51 35 44	49 52 43	48 10 10	46 28 4
	α Aquilæ	E.	90 56 43	89 23 37	87 50 55	86 18 37
11	Saturn	W.	85 25 28	87 9 55	88 53 54	90 37 26
	Regulus	W.	77 59 31	79 43 31	81 27 3	83 10 8
	Spica	W.	24 2 41	25 46 7	27 29 4	29 11 38
	Mars	E.	38 4 40	36 25 27	34 46 43	33 8 30
	α Aquilæ	E.	78 44 12	77 14 53	75 46 9	74 18 1
	Sun	E.	125 12 37	123 36 16	122 0 22	120 24 54
12	Saturn	W.	99 8 21	100 49 12	102 29 37	104 9 37
	Regulus	W.	91 38 49	93 19 13	94 59 12	96 38 46
	Spica	W.	37 38 30	39 18 39	40 58 23	42 37 42
	α Aquilæ	E.	67 7 6	65 43 1	64 19 41	62 57 9
	Sun	E.	112 34 14	111 1 25	109 29 1	107 57 2
13	Regulus	W.	104 50 19	106 27 26	108 4 11	109 40 33
	Spica	W.	50 48 25	52 25 24	54 2 1	55 38 16
	α Aquilæ	E.	56 17 16	55 0 6	53 43 57	52 28 52
	Sun	E.	100 23 21	98 53 48	97 24 38	95 55 50
14	Spica	W.	63 34 18	65 8 31	66 42 26	68 16 3
	Antares	W.	17 42 8	19 16 30	20 50 33	22 24 18
	Sun	E.	88 37 10	87 10 26	85 44 1	84 17 54
15	Spica	W.	75 59 55	77 31 55	79 3 40	80 35 12
	Antares	W.	30 8 48	31 40 55	33 12 48	34 44 26
	Sun	E.	77 11 37	75 47 9	74 22 56	72 58 56
16	Spica	W.	88 9 43	89 40 4	91 10 15	92 40 16
	Antares	W.	42 19 32	43 50 0	45 20 17	46 50 25
	Mars	W.	23 50 47	25 15 59	26 41 9	28 6 15
	Sun	E.	66 2 10	64 39 24	63 16 48	61 54 22
17	Spica	W.	100 8 16	101 37 30	103 6 38	104 35 41
	Antares	W.	54 18 59	55 48 20	57 17 35	58 46 45
	Mars	W.	35 10 43	36 35 24	38 0 1	39 24 35
	Sun	E.	55 4 23	53 42 46	52 21 16	50 59 53
18	Antares	W.	66 11 26	67 40 11	69 8 54	70 37 35
	Mars	W.	46 26 39	47 50 57	49 15 14	50 39 30
	Sun	E.	44 14 16	42 53 24	41 32 34	40 11 48

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
9	Pollux	W.	93 34 23	95 23 17	97 11 47	98 59 52
	Saturn	W.	63 57 23	65 47 4	67 36 21	69 25 14
	Regulus	W.	56 37 0	58 26 13	60 15 2	62 3 26
	Antares	E.	43 20 22	41 31 4	39 42 10	37 53 41
	Mars	E.	58 32 6	56 47 23	55 3 4	53 19 10
	α Aquilæ	E.	97 12 20	95 38 0	94 3 56	92 30 10
10	Jupiter	W.	113 29 23	115 15 12	117 0 33	118 45 27
	Pollux	W.	107 53 43	109 39 9	111 24 7	113 8 38
	Saturn	W.	78 23 9	80 9 24	81 55 13	83 40 34
	Regulus	W.	70 59 2	72 44 50	74 30 11	76 15 4
	Antares	E.	28 57 43	27 11 49	25 26 20	23 41 17
	Mars	E.	44 46 26	43 5 17	41 24 35	39 44 23
	α Aquilæ	E.	84 46 46	83 15 22	81 44 28	80 14 4
11	Saturn	W.	92 20 31	94 3 9	95 45 20	97 27 4
	Regulus	W.	84 52 46	86 34 56	88 16 40	89 57 58
	Spica	W.	30 53 49	32 35 36	34 16 58	35 57 56
	Mars	E.	31 30 46	29 53 35	28 16 54	26 40 46
	α Aquilæ	E.	72 50 30	71 23 38	69 57 25	68 31 55
	Sun	E.	118 49 53	117 15 19	115 41 11	114 7 29
12	Saturn	W.	105 49 11	107 28 20	109 7 4	110 45 24
	Regulus	W.	98 17 54	99 56 36	101 34 54	103 12 48
	Spica	W.	44 16 38	45 55 10	47 33 18	49 11 3
	α Aquilæ	E.	61 35 25	60 14 32	58 54 31	57 35 25
	Sun	E.	106 25 29	104 54 21	103 23 37	101 53 17
13	Regulus	W.	111 16 33	112 52 12	114 27 29	116 2 25
	Spica	W.	57 14 9	58 49 42	60 24 54	61 59 46
	α Aquilæ	E.	51 14 53	50 2 3	48 50 26	47 40 8
	Sun	E.	94 27 24	92 59 20	91 31 37	90 4 13
14	Spica	W.	69 49 22	71 22 24	73 55 11	74 27 40
	Antares	W.	23 57 45	25 30 55	27 3 48	28 36 26
	Sun	E.	82 52 5	81 26 34	80 1 19	78 36 20
15	Spica	W.	82 6 30	83 37 36	85 8 30	86 39 12
	Antares	W.	36 15 52	37 47 5	39 18 5	40 48 54
	Sun	E.	71 35 10	70 11 37	68 48 16	67 25 8
16	Spica	W.	94 10 8	95 39 52	97 9 27	98 38 56
	Antares	W.	48 20 24	49 50 14	51 19 56	52 49 31
	Mars	W.	29 31 17	30 56 15	32 21 8	33 45 58
	Sun	E.	60 32 5	59 9 57	57 47 58	56 26 7
17	Spica	W.	106 4 38	107 33 31	109 2 19	110 31 4
	Antares	W.	60 15 50	61 44 50	63 13 46	64 42 38
	Mars	W.	40 49 5	42 13 32	43 37 57	45 2 19
	Sun	E.	49 38 35	48 17 24	46 56 17	45 35 14
18	Antares	W.	72 6 13	73 34 50	75 3 26	76 32 1
	Mars	W.	52 3 44	53 27 57	54 52 10	56 16 24
	Sun	E.	38 51 5	37 30 26	36 9 50	34 49 17

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
19	Antares	W.	78 0 36	79 29 11	80 57 46	82 26 22
	Mars	W.	57 40 37	59 4 50	60 29 5	61 53 22
	Sun	E.	33 28 47	32 8 20	30 47 55	29 27 34
24	Sun	W.	21 54 17	23 17 8	24 40 16	26 3 40
	Aldebaran	E.	43 35 1	42 6 18	40 37 39	39 9 3
	Jupiter	E.	80 2 13	78 30 52	76 59 23	75 27 46
	Pollux	E.	85 18 21	83 47 0	82 15 31	80 43 54
25	Sun	W.	33 4 17	34 29 4	35 54 4	37 19 17
	Aldebaran	E.	31 48 1	30 20 28	28 53 15	27 26 27
	Jupiter	E.	67 47 25	66 14 53	64 42 11	63 9 19
	Pollux	E.	73 3 33	71 31 1	69 58 20	68 25 30
	Saturn	E.	101 46 46	100 13 36	98 40 16	97 6 45
	Regulus	E.	109 58 11	108 25 19	106 52 18	105 19 6
26	Sun	W.	44 28 32	45 55 2	47 21 44	48 48 40
	Jupiter	E.	55 22 22	53 48 25	52 14 17	50 39 57
	Pollux	E.	60 38 45	59 4 53	57 30 50	55 56 37
	Saturn	E.	89 16 31	87 41 55	86 7 7	84 32 6
	Regulus	E.	97 30 25	95 56 6	94 21 36	92 46 54
27	Sun	W.	56 6 41	57 35 0	59 3 33	60 32 21
	Jupiter	E.	42 45 12	41 9 35	39 33 45	37 57 42
	Pollux	E.	48 2 37	46 27 14	44 51 40	43 15 54
	Saturn	E.	76 33 56	74 57 38	73 21 6	71 44 20
	Regulus	E.	84 50 12	83 14 11	81 37 56	80 1 28
28	Sun	W.	68 0 15	69 30 38	71 1 17	72 32 13
	Venus	W.	26 46 58	28 15 35	29 44 33	31 13 53
	Jupiter	E.	29 53 49	28 16 18	26 38 32	25 0 30
	Pollux	E.	35 14 14	33 37 21	32 0 19	30 23 8
	Saturn	E.	63 36 48	61 58 31	60 19 58	58 41 8
	Regulus	E.	71 55 17	70 17 15	68 38 58	67 0 24
29	Sun	W.	80 11 17	81 43 59	83 17 0	84 50 20
	Venus	W.	38 45 39	40 17 1	41 48 43	43 20 45
	Aldebaran	W.	23 3 50	24 34 37	26 6 46	27 40 9
	Saturn	E.	50 22 47	48 42 14	47 1 23	45 20 15
	Regulus	E.	58 43 16	57 2 57	55 22 20	53 41 24
	Spica	E.	112 46 19	111 6 4	109 25 29	107 44 36
30	Sun	W.	92 41 49	94 17 6	95 52 42	97 28 38
	Venus	W.	51 6 7	52 40 14	54 14 41	55 49 30
	Aldebaran	W.	35 41 18	37 19 51	38 59 3	40 38 52
	Saturn	E.	36 49 54	35 6 54	33 23 35	31 39 57
	Regulus	E.	45 12 1	43 29 11	41 46 1	40 2 32
	Spica	E.	99 15 16	97 32 25	95 49 14	94 5 43
31	Sun	W.	105 33 22	107 11 19	108 49 35	110 28 10
	Venus	W.	63 48 50	65 25 46	67 3 2	68 40 38
	Aldebaran	W.	49 6 9	50 49 7	52 32 32	54 16 24
	Regulus	E.	31 20 17	29 34 53	27 49 11	26 3 10
	Spica	E.	85 23 2	83 37 29	81 51 35	80 5 22

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
19	Antares	W.	83 54 58	85 23 36	86 52 15	88 20 56
	Mars	W.	63 17 39	64 41 57	66 6 18	67 30 42
	Sun	E.	28 7 17	26 47 2	25 26 52	24 6 46
24	Sun	W.	27 27 20	28 51 14	30 15 22	31 39 43
	Aldebaran	E.	37 40 33	36 12 10	34 43 56	33 15 52
	Jupiter	E.	73 56 0	72 24 5	70 52 1	69 19 48
	Pollux	E.	79 12 7	77 40 11	76 8 8	74 35 56
25	Sun	W.	38 44 43	40 10 21	41 36 11	43 2 15
	Aldebaran	E.	26 0 10	24 34 32	23 9 42	21 45 52
	Jupiter	E.	61 36 17	60 3 4	58 29 41	56 56 7
	Pollux	E.	66 52 29	65 19 18	63 45 57	62 12 26
	Saturn	E.	95 33 4	93 59 12	92 25 9	90 50 56
	Regulus	E.	103 45 44	102 12 12	100 38 28	99 4 32
26	Sun	W.	50 15 49	51 43 11	53 10 46	54 38 36
	Jupiter	E.	49 5 25	47 30 41	45 55 44	44 20 35
	Pollux	E.	54 22 11	52 47 34	51 12 46	49 37 48
	Saturn	E.	82 56 54	81 21 29	79 45 51	78 10 0
	Regulus	E.	91 12 0	89 36 52	88 1 31	86 25 58
27	Sun	W.	62 1 25	63 30 44	65 0 18	66 30 8
	Jupiter	E.	36 21 24	34 44 52	33 8 6	31 31 5
	Pollux	E.	41 39 57	40 3 48	38 27 27	36 50 56
	Saturn	E.	70 7 20	68 30 5	66 52 35	65 14 49
	Regulus	E.	78 24 44	76 47 45	75 10 31	73 33 2
28	Sun	W.	74 3 26	75 34 57	77 6 46	78 38 53
	Venus	W.	32 43 34	34 13 35	35 43 56	37 14 37
	Jupiter	E.	23 22 13	21 43 41	20 4 55	18 25 54
	Pollux	E.	28 45 49	27 8 23	25 30 53	23 53 23
	Saturn	E.	57 2 2	55 22 39	53 42 59	52 3 2
	Regulus	E.	65 21 33	63 42 25	62 3 0	60 23 17
29	Sun	W.	86 24 0	87 57 58	89 32 15	91 6 52
	Venus	W.	44 53 8	46 25 51	47 58 55	49 32 21
	Aldebaran	W.	29 14 36	30 50 2	32 26 20	34 3 27
	Saturn	E.	43 38 48	41 57 2	40 14 58	38 32 35
	Regulus	E.	52 0 10	50 18 36	48 36 44	46 54 32
	Spica	E.	106 3 23	104 21 51	102 39 59	100 57 47
30	Sun	W.	99 4 55	100 41 32	102 18 28	103 55 45
	Venus	W.	57 24 40	59 0 10	60 36 2	62 12 15
	Aldebaran	W.	42 19 15	44 0 12	45 41 41	47 23 40
	Saturn	E.	29 56 2	28 11 49	26 27 18	24 42 30
	Regulus	E.	38 18 44	36 34 36	34 50 9	33 5 22
	Spica	E.	92 21 52	90 37 40	88 53 8	87 8 15
31	Sun	W.	112 7 5	113 46 20	115 25 54	117 5 45
	Venus	W.	70 18 35	71 56 53	73 35 31	75 14 27
	Aldebaran	W.	56 0 41	57 45 24	59 30 31	61 16 2
	Regulus	E.	24 16 53	22 30 20	20 43 32	18 56 30
	Spica	E.	78 18 49	76 31 56	74 44 43	72 57 11

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Sun	W.	118 45 54	120 26 22	122 7 8	123 48 10
	Venus	W.	76 53 45	78 33 22	80 13 17	81 53 31
	Aldebaran	W.	63 2 0	64 48 18	66 34 57	68 21 58
	Jupiter	W.	24 49 40	26 37 15	28 25 10	30 13 25
	Pollux	W.	20 34 50	22 19 53	24 5 42	25 52 11
	Spica	E.	71 9 21	69 21 12	67 32 45	65 43 59
2	Venus	W.	90 19 1	92 0 55	93 43 4	95 25 27
	Aldebaran	W.	77 21 47	79 10 37	80 59 43	82 49 3
	Jupiter	W.	39 19 3	41 8 59	42 59 10	44 49 35
	Pollux	W.	34 52 19	36 41 35	38 31 13	40 21 9
	Spica	E.	56 35 58	54 45 35	52 54 59	51 4 10
	Antares	E.	102 22 57	100 32 23	98 41 35	96 50 33
3	Venus	W.	104 0 25	105 43 55	107 27 33	109 11 18
	Jupiter	W.	54 4 42	55 56 13	57 47 52	59 39 39
	Pollux	W.	49 34 49	51 26 11	53 17 44	55 9 26
	Saturn	W.	21 2 23	22 54 3	24 45 58	26 38 4
	Spica	E.	41 47 19	39 55 30	38 3 35	36 11 34
	Antares	E.	87 32 25	85 40 17	83 48 2	81 55 39
	Mars	E.	115 53 49	114 5 41	112 17 25	110 29 1
4	Jupiter	W.	68 59 41	70 51 47	72 43 54	74 35 58
	Pollux	W.	64 29 28	66 21 39	68 13 50	70 6 0
	Saturn	W.	36 0 26	37 53 6	39 45 46	41 38 26
	Regulus	W.	27 27 45	29 20 8	31 12 32	33 4 57
	Antares	E.	72 32 36	70 39 53	68 47 11	66 54 30
	Mars	E.	101 25 44	99 36 57	97 48 11	95 59 25
5	Jupiter	W.	83 55 23	85 46 56	87 38 20	89 29 33
	Pollux	W.	79 26 6	81 17 49	83 9 24	85 0 49
	Saturn	W.	51 1 2	52 53 15	54 45 20	56 37 15
	Regulus	W.	42 26 26	44 18 26	46 10 19	48 2 2
	Antares	E.	57 32 0	55 39 50	53 47 48	51 55 57
	Mars	E.	86 56 28	85 8 11	83 20 3	81 32 5
6	Jupiter	W.	98 42 36	100 32 29	102 22 4	104 11 22
	Saturn	W.	65 53 47	67 44 22	69 34 41	71 24 42
	Regulus	W.	57 17 39	59 8 4	60 58 12	62 48 3
	Antares	E.	42 39 44	40 49 13	38 58 59	37 9 2
	Mars	E.	72 35 16	70 48 37	69 2 15	67 16 11
	α Aquilæ	E.	96 34 40	94 59 4	93 23 38	91 48 24
7	Saturn	W.	80 29 59	82 18 0	84 5 39	85 52 54
	Regulus	W.	71 52 32	73 40 24	75 27 53	77 14 59
	Mars	E.	58 30 36	56 46 32	55 2 49	53 19 29
	α Aquilæ	E.	83 56 29	82 23 11	80 50 18	79 17 53
	Fomalhaut	E.	108 39 50	107 1 27	105 23 14	103 45 13
8	Saturn	W.	94 43 13	96 28 2	98 12 26	99 56 25
	Regulus	W.	86 4 33	87 49 14	89 33 30	91 17 20
	Spica	W.	32 4 35	33 48 55	35 32 52	37 16 25
	Mars	E.	44 48 49	43 7 55	41 27 27	39 47 24
	α Aquilæ	E.	71 43 53	70 14 54	68 46 35	67 18 59
	Fomalhaut	E.	95 38 58	94 2 39	92 26 41	90 51 6

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Sun	W.	125 29 29	127 11 4	128 52 54	130 34 59
	Venus	W.	83 34 3	85 14 52	86 55 58	88 37 21
	Aldebaran	W.	70 9 18	71 56 57	73 44 57	75 33 13
	Jupiter	W.	32 1 58	33 50 49	35 39 57	37 29 22
	Pollux	W.	27 39 15	29 26 51	31 14 54	33 3 24
	Spica	E.	63 54 55	62 5 34	60 15 58	58 26 6
2	Venus	W.	97 8 3	98 50 52	100 33 52	102 17 4
	Aldebaran	W.	84 38 37	86 28 23	88 18 22	90 8 31
	Jupiter	W.	46 40 14	48 31 4	50 22 6	52 13 19
	Pollux	W.	42 11 23	44 1 53	45 52 38	47 43 37
	Spica	E.	49 13 9	47 21 56	45 30 33	43 39 0
	Antares	E.	94 59 18	93 7 51	91 16 12	89 24 24
3	Venus	W.	110 55 10	112 39 6	114 23 7	116 7 10
	Jupiter	W.	61 31 32	63 23 29	65 15 30	67 7 35
	Pollux	W.	57 1 16	58 53 12	60 45 14	62 37 19
	Saturn	W.	28 30 20	30 22 43	32 15 13	34 7 48
	Spica	E.	34 19 30	32 27 23	30 35 15	28 43 8
	Antares	E.	80 3 10	78 10 37	76 17 59	74 25 19
	Mars	E.	108 40 30	106 51 54	105 3 14	103 14 31
4	Jupiter	W.	76 28 1	78 20 0	80 11 54	82 3 42
	Pollux	W.	71 58 10	73 50 16	75 42 19	77 34 16
	Saturn	W.	43 31 6	45 23 42	47 16 14	49 8 41
	Regulus	W.	34 57 22	36 49 44	38 42 3	40 34 17
	Antares	E.	65 1 50	63 9 15	61 16 44	59 24 18
	Mars	E.	94 10 40	92 22 0	90 33 24	88 44 52
5	Jupiter	W.	91 20 36	93 11 27	95 2 5	96 52 28
	Pollux	W.	86 52 3	88 43 5	90 33 55	92 24 30
	Saturn	W.	58 28 59	60 20 31	62 11 51	64 2 57
	Regulus	W.	49 53 35	51 44 56	53 36 4	55 26 59
	Antares	E.	50 4 17	48 12 48	46 21 33	44 30 31
	Mars	E.	79 44 18	77 56 42	76 9 19	74 22 10
6	Jupiter	W.	106 0 22	107 49 2	109 37 23	111 25 22
	Saturn	W.	73 14 25	75 3 49	76 52 53	78 41 36
	Regulus	W.	64 37 36	66 26 51	68 15 45	70 4 19
	Antares	E.	35 19 24	33 30 4	31 41 5	29 52 27
	Mars	E.	65 30 25	63 44 57	61 59 49	60 15 2
	α Aquilæ	E.	90 13 26	88 38 42	87 4 16	85 30 11
7	Saturn	W.	87 39 46	89 26 15	91 12 19	92 57 58
	Regulus	W.	79 1 41	80 48 1	82 33 57	84 19 27
	Mars	E.	51 36 33	49 54 0	48 11 52	46 30 8
	α Aquilæ	E.	77 45 59	76 14 35	74 43 45	73 13 30
	Fomalhaut	E.	102 7 25	100 29 52	98 52 36	97 15 38
8	Saturn	W.	101 39 57	103 23 4	105 5 44	106 47 59
	Regulus	W.	93 0 45	94 43 44	96 26 17	98 8 24
	Spica	W.	38 59 35	40 42 20	42 24 40	44 6 36
	Mars	E.	38 7 48	36 28 37	34 49 53	33 11 34
	α Aquilæ	E.	65 52 8	64 26 3	63 0 46	61 36 19
	Fomalhaut	E.	89 15 53	87 41 5	86 6 42	84 32 44

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon. ° ′ ″	IIIh. ° ′ ″	VIh. ° ′ ″	IXh. ° ′ ″
9	Saturn	W.	108 29 48	110 11 11	111 52 10	113 32 45
	Regulus	W.	99 50 5	101 31 21	103 12 11	104 52 35
	Spica	W.	45 48 8	47 29 14	49 9 55	50 50 12
	Mars	E.	31 33 44	29 56 19	28 19 20	26 42 47
	α Aquilæ	E.	60 12 46	58 50 7	57 28 26	56 7 44
	Fomalhaut	E.	82 59 12	81 26 8	79 53 32	78 21 24
	Sun	E.	131 58 23	130 25 0	128 52 1	127 19 25
10	Spica	W.	59 5 28	60 43 19	62 20 46	63 57 50
	Antares	W.	13 13 34	14 51 35	16 29 12	18 6 26
	α Aquilæ	E.	49 40 59	48 27 21	47 15 6	46 4 20
	Fomalhaut	E.	70 48 14	69 19 11	67 50 40	66 22 41
	α Pegasi	E.	91 41 10	90 6 55	88 33 3	86 59 34
	Sun	E.	119 42 26	118 12 13	116 42 24	115 12 57
11	Spica	W.	71 57 33	73 32 25	75 6 57	76 41 10
	Antares	W.	26 6 52	27 41 51	29 16 30	30 50 49
	Fomalhaut	E.	59 11 40	57 47 19	56 23 37	55 0 36
	α Pegasi	E.	79 17 48	77 46 35	76 15 44	74 45 15
	Sun	E.	107 51 11	106 23 54	104 56 57	103 30 19
12	Spica	W.	84 27 32	85 59 56	87 32 3	89 3 56
	Antares	W.	38 37 41	40 10 11	41 42 26	43 14 25
	Fomalhaut	E.	48 16 33	46 58 10	45 40 41	44 24 7
	α Pegasi	E.	67 18 19	65 50 0	64 22 4	62 54 29
	Sun	E.	96 21 49	94 56 58	93 32 24	92 8 6
13	Spica	W.	96 39 43	98 10 14	99 40 33	101 10 41
	Antares	W.	50 50 45	52 21 22	53 51 47	55 22 2
	Mars	W.	17 32 6	18 58 41	20 25 8	21 51 27
	α Pegasi	E.	55 41 55	54 16 30	52 51 27	51 26 48
	Sun	E.	85 10 7	83 47 10	82 24 25	81 1 51
14	Antares	W.	62 50 53	64 20 14	65 49 29	67 18 38
	Mars	W.	29 1 18	30 26 53	31 52 13	33 17 38
	α Pegasi	E.	44 29 40	43 7 35	41 46 1	40 24 58
	Sun	E.	74 11 26	72 49 46	71 28 13	70 6 47
15	Antares	W.	74 43 4	76 11 47	77 40 26	79 9 5
	Mars	W.	40 23 37	41 48 39	43 13 39	44 38 39
	Sun	E.	63 20 56	61 59 59	60 39 4	59 18 11
16	Antares	W.	86 32 3	88 0 39	89 29 17	90 57 57
	Mars	W.	51 43 30	53 8 30	54 33 32	55 58 36
	α Aquilæ	W.	42 23 57	43 24 18	44 25 57	45 28 49
	Sun	E.	52 34 15	51 13 29	49 52 43	48 31 57
17	Antares	W.	98 22 1	99 51 1	101 20 6	102 49 16
	Mars	W.	63 4 48	64 30 15	65 55 46	67 21 23
	α Aquilæ	W.	50 58 41	52 7 21	53 16 47	54 26 58
	Sun	E.	41 47 44	40 26 49	39 5 51	37 44 50
18	Mars	W.	74 31 1	75 57 17	77 23 41	78 50 12
	α Aquilæ	W.	60 27 36	61 41 26	62 55 46	64 10 36
	Sun	E.	30 59 11	29 37 59	28 16 45	26 55 32

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
9	Saturn	W.	115 12 55	116 52 41	118 32 5	120 11 7
	Regulus	W.	106 32 34	108 12 7	109 51 16	111 29 59
	Spica	W.	52 30 4	54 9 31	55 48 34	57 27 13
	Mars	E.	25 6 41	23 31 2	21 55 50	20 21 5
	a Aquilæ	E.	54 48 5	53 29 33	52 12 9	50 55 55
	Fomalhaut	E.	76 49 45	75 18 36	73 47 58	72 17 50
	Sun	E.	125 47 13	124 15 26	122 44 3	121 13 3
10	Spica	W.	65 34 31	67 10 49	68 46 45	70 22 20
	Antares	W.	19 43 17	21 19 44	22 55 49	24 31 32
	a Aquilæ	E.	44 55 7	43 47 28	42 41 33	41 37 31
	Fomalhaut	E.	64 55 18	63 28 29	62 2 16	60 36 39
	a Pegasi	E.	85 26 27	83 53 44	82 21 23	80 49 24
	Sun	E.	113 43 52	112 15 9	110 46 49	109 18 50
11	Spica	W.	78 15 3	79 48 37	81 21 53	82 54 51
	Antares	W.	32 24 48	33 58 27	35 31 50	37 4 55
	Fomalhaut	E.	53 38 17	52 16 42	50 55 51	49 35 47
	a Pegasi	E.	73 15 8	71 45 23	70 16 0	68 46 59
	Sun	E.	102 4 0	100 38 1	99 12 20	97 46 56
12	Spica	W.	90 35 33	92 6 56	93 38 5	95 9 0
	Antares	W.	44 46 9	46 17 38	47 48 53	49 19 56
	Fomalhaut	E.	43 8 34	41 54 5	40 40 42	39 28 31
	a Pegasi	E.	61 27 14	60 0 22	58 33 52	57 7 42
	Sun	E.	90 44 2	89 20 13	87 56 38	86 33 16
13	Spica	W.	102 40 39	104 10 27	105 40 5	107 9 35
	Antares	W.	56 52 7	58 22 1	59 51 47	61 21 24
	Mars	W.	23 17 38	24 43 41	26 9 37	27 35 26
	a Pegasi	E.	50 2 32	48 38 40	47 15 14	45 52 14
	Sun	E.	79 39 27	78 17 13	76 55 9	75 33 13
14	Antares	W.	68 47 40	70 16 37	71 45 30	73 14 19
	Mars	W.	34 42 58	36 8 14	37 33 25	38 58 32
	a Pegasi	E.	39 4 30	37 44 39	36 25 26	35 6 58
	Sun	E.	68 45 27	67 24 12	66 3 2	64 41 57
15	Antares	W.	80 37 41	82 6 17	83 34 52	85 3 27
	Mars	W.	46 3 37	47 28 34	48 53 32	50 18 31
	Sun	E.	57 57 22	56 36 34	55 15 47	53 55 1
16	Antares	W.	92 26 39	93 55 24	95 24 13	96 53 5
	Mars	W.	57 23 44	58 48 54	60 14 8	61 39 26
	a Aquilæ	W.	46 32 48	47 37 51	48 43 53	49 50 50
	Sun	E.	47 11 9	45 50 20	44 29 30	43 8 38
17	Antares	W.	104 18 32	105 47 53	107 17 20	108 46 53
	Mars	W.	68 47 6	70 12 55	71 38 50	73 4 52
	a Aquilæ	W.	55 37 51	56 49 22	58 1 32	59 14 17
	Sun	E.	36 23 47	35 2 41	33 41 33	32 20 23
18	Mars	W.	80 16 52	81 43 40	83 10 37	84 37 43
	a Aquilæ	W.	65 25 54	66 41 38	67 57 47	69 14 19
	Sun	E.	25 34 18	24 13 8	22 52 1	21 31 0

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
23	Sun	W.	26 50 49	28 18 33	29 46 36	31 15 0
	Jupiter	E.	48 9 26	46 33 44	44 57 51	43 21 47
	Pollux	E.	51 3 35	49 27 38	47 51 31	46 15 16
	Saturn	E.	79 6 1	77 29 29	75 52 48	74 15 55
	Regulus	E.	87 51 32	86 14 57	84 38 10	83 1 12
24	Sun	W.	38 41 10	40 11 12	41 41 28	43 11 59
	Jupiter	E.	35 18 35	33 41 23	32 3 59	30 26 24
	Pollux	E.	38 11 50	36 34 47	34 57 38	33 20 23
	Saturn	E.	66 8 36	64 30 33	62 52 19	61 13 54
	Regulus	E.	74 53 29	73 15 21	71 37 2	69 58 30
25	Sun	W.	50 48 6	52 20 1	53 52 9	55 24 31
	Aldebaran	W.	20 18 38	21 46 38	23 16 18	24 47 26
	Saturn	E.	52 58 52	51 19 16	49 39 29	47 59 30
	Regulus	E.	61 42 57	60 3 14	58 23 19	56 43 13
	Spica	E.	115 46 9	114 6 28	112 26 36	110 46 31
26	Sun	W.	63 9 42	65 43 25	67 17 21	68 51 29
	Aldebaran	W.	32 38 35	34 15 8	35 52 17	37 30 0
	Venus	W.	18 16 31	19 50 7	21 23 57	22 58 0
	Saturn	E.	39 36 41	37 55 32	36 14 13	34 32 42
	Regulus	E.	48 19 37	46 38 18	44 56 46	43 15 2
	Spica	E.	102 22 58	100 41 37	99 0 4	97 18 18
27	Sun	W.	75 45 35	77 21 4	78 56 46	80 32 42
	Aldebaran	W.	45 45 34	47 25 54	49 6 36	50 47 40
	Venus	W.	30 51 34	32 26 58	34 2 35	35 38 25
	Saturn	E.	26 2 25	24 19 52	22 37 11	20 54 23
	Regulus	E.	34 43 23	33 0 28	31 17 22	29 34 4
	Spica	E.	88 46 12	87 3 9	85 19 52	83 36 22
28	Sun	W.	88 35 37	90 12 52	91 50 19	93 27 59
	Aldebaran	W.	59 17 41	61 0 35	62 43 46	64 27 12
	Venus	W.	43 40 59	45 18 9	46 55 32	48 33 10
	Jupiter	W.	18 18 7	20 1 52	21 45 50	23 30 2
	Spica	E.	74 55 41	73 10 54	71 25 54	69 40 41
	Antares	E.	120 43 33	118 58 37	117 13 30	115 28 9
29	Sun	W.	101 39 26	103 18 19	104 57 23	106 36 39
	Aldebaran	W.	73 8 14	74 53 9	76 38 17	78 23 39
	Venus	W.	56 44 29	58 23 22	60 2 28	61 41 46
	Jupiter	W.	32 14 24	33 59 54	35 45 37	37 31 31
	Pollux	W.	30 43 7	32 28 0	34 13 15	35 58 49
	Spica	E.	60 51 36	59 5 11	57 18 34	55 31 47
	Antares	E.	106 38 17	104 51 42	103 4 55	101 17 56
30	Sun	W.	114 55 37	116 35 54	118 16 19	119 56 52
	Venus	W.	70 1 4	71 41 28	73 22 2	75 2 45
	Jupiter	W.	46 23 49	48 10 48	49 57 56	51 45 14
	Pollux	W.	44 50 50	46 37 57	48 25 17	50 12 49
	Saturn	W.	16 27 42	18 14 26	20 1 32	21 48 56
	Spica	E.	46 35 12	44 47 25	42 59 30	41 11 26
	Antares	E.	92 20 17	90 32 14	88 44 2	86 55 40

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
23	Sun	W.	32 43 42	34 12 39	35 41 53	37 11 24
	Jupiter	E.	41 45 32	40 9 4	38 32 26	36 55 36
	Pollux	E.	44 38 51	43 2 18	41 25 37	39 48 47
	Saturn	E.	72 38 50	71 1 33	69 24 6	67 46 27
	Regulus	E.	81 24 2	79 46 41	78 9 9	76 31 25
24	Sun	W.	44 42 44	46 13 44	47 44 57	49 16 25
	Jupiter	E.	28 48 36	27 10 38	25 32 29	23 54 8
	Pollux	E.	31 43 4	30 5 41	28 28 17	26 50 55
	Saturn	E.	59 35 17	57 56 28	56 17 27	54 38 15
	Regulus	E.	68 19 47	66 40 52	65 1 45	63 22 27
25	Sun	W.	56 57 7	58 29 56	60 2 57	61 36 13
	Aldebaran	W.	26 19 47	27 53 12	29 27 32	31 2 42
	Saturn	E.	46 19 20	44 38 58	42 58 23	41 17 38
	Regulus	E.	55 2 54	53 22 23	51 41 40	50 0 45
	Spica	E.	109 6 14	107 25 44	105 45 1	104 4 6
26	Sun	W.	69 25 52	71 0 28	72 35 17	74 10 20
	Aldebaran	W.	39 8 13	40 46 55	42 26 3	44 5 37
	Venus	W.	24 32 15	26 6 45	27 41 28	29 16 25
	Saturn	E.	32 51 0	31 9 7	29 27 3	27 44 49
	Regulus	E.	41 33 6	39 50 58	38 8 37	36 26 6
	Spica	E.	95 36 18	93 54 6	92 11 41	90 29 3
27	Sun	W.	82 8 50	83 45 12	85 21 47	86 58 36
	Aldebaran	W.	52 29 3	54 10 45	55 52 46	57 35 5
	Venus	W.	37 14 29	38 50 47	40 27 18	42 4 2
	Saturn	E.	19 11 30	17 28 35	15 45 40	14 2 48
	Regulus	E.	27 50 36	26 6 57	24 23 9	22 39 11
	Spica	E.	81 52 40	80 8 44	78 24 36	76 40 15
28	Sun	W.	95 5 52	96 43 57	98 22 14	100 0 44
	Aldebaran	W.	66 10 54	67 54 52	69 39 5	71 23 33
	Venus	W.	50 11 0	51 49 4	53 27 20	55 5 48
	Jupiter	W.	25 14 28	26 59 8	28 44 1	30 29 7
	Spica	E.	67 55 17	66 9 40	64 23 50	62 37 49
	Antares	E.	113 42 36	111 56 50	110 10 51	108 24 40
29	Sun	W.	108 16 6	109 55 45	111 35 33	113 15 30
	Aldebaran	W.	80 9 13	81 54 58	83 40 56	85 27 4
	Venus	W.	63 21 15	65 0 56	66 40 48	68 20 51
	Jupiter	W.	39 17 37	41 3 54	42 50 22	44 37 1
	Pollux	W.	37 44 41	39 30 50	41 17 15	43 3 55
	Spica	E.	53 44 48	51 57 39	50 10 20	48 22 51
	Antares	E.	99 30 46	97 43 25	95 55 53	94 8 10
30	Sun	W.	121 37 33	123 18 21	124 59 16	126 40 17
	Venus	W.	76 43 38	78 24 38	80 5 47	81 47 4
	Jupiter	W.	53 32 40	55 20 14	57 7 56	58 55 46
	Pollux	W.	52 0 32	53 48 26	55 36 29	57 24 42
	Saturn	W.	23 36 35	25 24 28	27 12 33	29 0 50
	Spica	E.	39 23 14	37 34 56	35 46 33	33 58 3
	Antares	E.	85 7 10	83 18 32	81 29 46	79 40 52

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Venus	W.	83 28 28	85 9 58	86 51 34	88 33 16
	Jupiter	W.	60 43 42	62 31 44	64 19 53	66 8 6
	Pollux	W.	59 13 3	61 1 32	62 50 8	64 38 49
	Saturn	W.	30 49 17	32 37 51	34 26 34	36 15 24
	Spica	E.	32 9 29	30 20 51	28 32 11	26 43 31
	Antares	E.	77 51 52	76 2 45	74 13 32	72 24 15
	Mars	E.	119 19 54	117 33 51	115 47 42	114 1 27
2	Venus	W.	97 2 46	98 44 47	100 26 50	102 8 52
	Jupiter	W.	75 10 7	76 58 37	78 47 9	80 35 39
	Pollux	W.	73 43 30	75 32 34	77 21 40	79 10 45
	Saturn	W.	45 20 46	47 9 59	48 59 13	50 48 28
	Regulus	W.	36 42 46	38 32 7	40 21 29	42 10 53
	Antares	E.	63 16 52	61 27 17	59 37 41	57 48 6
	Mars	E.	105 9 13	103 22 40	101 36 6	99 49 30
3	Jupiter	W.	89 37 43	91 25 56	93 14 3	95 2 4
	Pollux	W.	88 15 48	90 4 37	91 53 21	93 41 59
	Saturn	W.	59 54 19	61 43 19	63 32 13	65 21 1
	Regulus	W.	51 17 30	53 6 40	54 55 45	56 44 44
	Antares	E.	48 40 36	46 51 18	45 2 4	43 12 58
	Mars	E.	90 56 59	89 10 40	87 24 25	85 38 17
4	Jupiter	W.	104 0 4	105 47 11	107 34 6	109 20 48
	Saturn	W.	74 23 2	76 10 56	77 58 38	79 46 9
	Regulus	W.	65 47 42	67 35 48	69 23 42	71 11 25
	Antares	E.	34 9 26	32 21 12	30 33 9	28 45 19
	Mars	E.	76 49 30	75 4 14	73 19 10	71 34 17
	a Aquilæ	E.	89 12 22	87 38 23	86 4 36	84 31 3
5	Saturn	W.	88 40 13	90 26 15	92 12 0	93 57 28
	Regulus	W.	80 6 31	81 52 46	83 38 44	85 24 24
	Spica	W.	26 7 41	27 53 24	29 38 54	31 24 10
	Mars	E.	62 53 17	61 9 51	59 26 41	57 43 49
	a Aquilæ	E.	76 47 59	75 16 32	73 45 33	72 15 4
	Fomalhaut	E.	101 9 54	99 32 31	97 55 18	96 18 17
6	Saturn	W.	102 40 4	104 23 36	106 6 48	107 49 38
	Regulus	W.	94 8 8	95 51 54	97 35 21	99 18 27
	Spica	W.	40 6 29	41 50 3	43 33 18	45 16 13
	Mars	E.	49 13 58	47 32 58	45 52 18	44 11 58
	a Aquilæ	E.	64 51 22	63 24 38	61 58 40	60 33 30
	Fomalhaut	E.	88 16 54	86 41 31	85 6 28	83 31 47
7	Spica	W.	53 45 38	55 26 27	57 6 55	58 47 2
	Mars	E.	35 55 41	34 17 30	32 39 40	31 2 12
	a Aquilæ	E.	53 41 24	52 22 5	51 3 57	49 47 3
	Fomalhaut	E.	75 44 25	74 12 15	72 40 35	71 9 24
	a Pegasi	E.	96 45 49	95 8 37	93 31 46	91 55 15
8	Spica	W.	67 2 6	68 40 1	70 17 36	71 54 49
	Antares	W.	21 11 37	22 49 41	24 27 24	26 4 44
	Fomalhaut	E.	63 41 31	62 13 39	60 46 25	59 19 49
	a Pegasi	E.	83 58 1	82 23 40	80 49 41	79 16 5
	Sun	E.	138 58 29	137 28 26	135 58 43	134 29 18

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Venus	W.	90 15 3	91 56 54	93 38 48	95 20 46
	Jupiter	W.	67 56 24	69 44 46	71 33 10	73 21 38
	Pollux	W.	66 27 37	68 16 30	70 5 27	71 54 27
	Saturn	W.	38 4 20	39 53 21	41 42 26	43 31 35
	Spica	E.	24 54 51	23 6 13	21 17 40	19 29 14
	Antares	E.	70 34 53	68 45 27	66 55 58	65 6 26
	Mars	E.	112 15 7	110 28 44	108 42 17	106 55 46
2	Venus	W.	103 50 54	105 32 54	107 14 52	108 56 47
	Jupiter	W.	82 24 9	84 12 37	86 1 3	87 49 24
	Pollux	W.	80 59 51	82 48 54	84 37 55	86 26 54
	Saturn	W.	52 37 43	54 26 56	56 16 7	58 5 15
	Regulus	W.	44 0 16	45 49 38	47 38 58	49 28 16
	Antares	E.	55 58 30	54 8 58	52 19 27	50 30 0
	Mars	E.	98 2 55	96 16 22	94 29 52	92 43 23
3	Jupiter	W.	96 49 58	98 37 43	100 25 20	102 12 47
	Pollux	W.	95 30 30	97 18 52	99 7 6	100 55 10
	Saturn	W.	67 9 43	68 58 16	70 46 40	72 34 56
	Regulus	W.	58 33 36	60 22 21	62 10 57	63 59 24
	Antares	E.	41 23 58	39 35 7	37 46 23	35 57 50
	Mars	E.	83 52 14	82 6 20	80 20 34	78 34 57
4	Jupiter	W.	111 7 18	112 53 33	114 39 33	116 25 18
	Saturn	W.	81 33 28	83 20 31	85 7 20	86 53 55
	Regulus	W.	72 58 55	74 46 11	76 33 12	78 19 59
	Antares	E.	26 57 43	25 10 22	23 23 16	21 36 26
	Mars	E.	69 49 36	68 5 10	66 20 58	64 36 59
	a Aquilæ	E.	82 57 46	81 24 47	79 52 8	78 19 52
5	Saturn	W.	95 42 37	97 27 28	99 12 0	100 56 12
	Regulus	W.	87 9 47	88 54 51	90 39 37	92 24 2
	Spica	W.	33 9 11	34 53 56	36 38 25	38 22 36
	Mars	E.	56 1 13	54 18 56	52 36 58	50 55 18
	a Aquilæ	E.	70 45 6	69 15 43	67 46 56	66 18 49
	Fomalhaut	E.	94 41 28	93 4 55	91 28 37	89 52 36
6	Saturn	W.	109 32 7	111 14 14	112 56 0	114 37 24
	Regulus	W.	101 1 12	102 43 35	104 25 36	106 7 15
	Spica	W.	46 58 47	48 41 1	50 22 55	52 4 27
	Mars	E.	42 32 1	40 52 23	39 13 8	37 34 13
	a Aquilæ	E.	59 9 11	57 45 46	56 23 17	55 1 49
	Fomalhaut	E.	81 57 29	80 23 35	78 50 5	77 17 2
7	Spica	W.	60 26 46	62 6 9	63 45 10	65 23 49
	Mars	E.	29 25 6	27 48 23	26 12 1	24 36 1
	a Aquilæ	E.	48 31 28	47 17 17	46 4 35	44 53 26
	Fomalhaut	E.	69 38 44	68 8 35	66 38 59	65 9 57
	a Pegasi	E.	90 19 5	88 43 17	87 7 50	85 32 44
8	Spica	W.	73 31 41	75 8 12	76 44 22	78 20 13
	Antares	W.	27 41 44	29 18 24	30 54 40	32 30 37
	Fomalhaut	E.	57 53 54	56 28 39	55 4 7	53 40 19
	a Pegasi	E.	77 42 53	76 10 3	74 37 36	73 5 33
	Sun	E.	133 0 14	131 31 28	130 3 1	128 34 52

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
9	Spica	W.	79° 55′ 42″	81° 30′ 52″	83° 5′ 42″	84° 40′ 13″
	Antares	W.	34 6 14	35 41 31	37 16 28	38 51 6
	Fomalhaut	E.	52 17 17	50 55 4	49 33 40	48 13 9
	α Pegasi	E.	71 33 52	70 2 35	68 31 42	67 1 12
	Sun	E.	127 7 3	125 39 33	124 12 20	122 45 25
10	Spica	W.	92 28 13	94 0 57	95 33 25	97 5 37
	Antares	W.	46 39 41	48 12 31	49 45 7	51 17 26
	Fomalhaut	E.	41 45 29	40 31 21	39 18 31	38 7 5
	α Pegasi	E.	59 34 42	58 6 37	56 38 57	55 11 41
	Sun	E.	115 35 14	114 10 2	112 45 5	111 20 23
11	Spica	W.	104 42 59	106 13 47	107 44 23	109 14 47
	Antares	W.	58 55 23	60 26 18	61 57 1	63 27 33
	α Pegasi	E.	48 1 59	46 37 26	45 13 24	43 49 53
	Sun	E.	104 20 27	102 57 7	101 33 58	100 11 0
12	Antares	W.	70 57 40	72 27 15	73 56 42	75 26 2
	Mars	W.	25 21 12	26 48 10	28 15 2	29 41 47
	Sun	E.	93 18 40	91 56 38	90 34 44	89 12 56
13	Antares	W.	82 51 25	84 20 17	85 49 7	87 17 54
	Mars	W.	36 54 22	38 20 42	39 47 0	41 13 16
	Sun	E.	82 25 17	81 3 57	79 42 40	78 21 24
14	Antares	W.	94 41 42	96 10 30	97 39 19	99 8 11
	Mars	W.	48 24 33	49 50 51	51 17 13	52 43 36
	α Aquilæ	W.	48 3 10	49 9 57	50 17 35	51 26 4
	Sun	E.	71 35 23	70 14 9	68 52 54	67 31 36
15	Antares	W.	106 33 28	108 2 46	109 32 11	111 1 42
	Mars	W.	59 56 39	61 23 31	62 50 31	64 17 38
	α Aquilæ	W.	57 19 11	58 31 43	59 44 48	60 58 26
	Sun	E.	60 44 15	59 22 34	58 0 47	56 38 53
16	Mars	W.	71 35 10	73 3 8	74 31 16	75 59 35
	α Aquilæ	W.	67 13 51	68 30 15	69 47 4	71 4 16
	Fomalhaut	W.	42 10 44	43 24 6	44 38 26	45 53 41
	Sun	E.	49 47 42	48 25 5	47 2 19	45 39 24
17	Mars	W.	83 23 59	84 53 29	86 23 11	87 53 7
	α Aquilæ	W.	77 35 39	78 54 54	80 14 28	81 34 20
	Fomalhaut	W.	52 21 48	53 41 30	55 1 49	56 22 44
	Sun	E.	38 42 32	37 18 41	35 54 40	34 30 29
22	Sun	W.	21 25 48	22 57 41	24 29 59	26 2 42
	Jupiter	E.	29 49 24	28 9 33	26 29 30	24 49 16
	Saturn	E.	57 19 7	55 38 30	53 57 43	52 16 45
	Regulus	E.	65 10 25	63 29 21	61 48 6	60 6 39
23	Sun	W.	33 51 8	35 25 39	37 0 23	38 35 20
	Saturn	E.	43 49 19	42 7 21	40 25 15	38 43 0
	Regulus	E.	51 36 44	49 54 15	48 11 37	46 28 50
	Spica	E.	105 40 10	103 57 39	102 14 58	100 32 7

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
9	Spica	W.	86 14 25	87 48 18	89 21 53	90 55 11
	Antares	W.	40 25 25	41 59 25	43 33 7	45 6 33
	Fomalhaut	E.	46 53 34	45 34 57	44 17 21	43 0 50
	α Pegasi	E.	65 31 6	64 1 24	62 32 6	61 3 12
	Sun	E.	121 18 49	119 52 30	118 26 28	117 0 43
10	Spica	W.	98 37 35	100 9 17	101 40 45	103 11 59
	Antares	W.	52 49 30	54 21 19	55 52 54	57 24 15
	Fomalhaut	E.	36 57 8	35 48 48	34 42 12	33 37 27
	α Pegasi	E.	53 44 51	52 18 28	50 52 31	49 27 1
	Sun	E.	109 55 56	108 31 44	107 7 45	105 43 59
11	Spica	W.	110 45 0	112 15 2	113 44 55	115 14 38
	Antares	W.	64 57 54	66 28 4	67 58 5	69 27 57
	α Pegasi	E.	42 26 54	41 4 30	39 42 42	38 21 34
	Sun	E.	98 48 13	97 25 36	96 3 9	94 40 51
12	Antares	W.	76 55 17	78 24 26	79 53 30	81 22 30
	Mars	W.	31 8 27	32 35 2	34 1 33	35 27 59
	Sun	E.	87 51 14	86 29 38	85 8 7	83 46 40
13	Antares	W.	88 46 41	90 15 26	91 44 11	93 12 57
	Mars	W.	42 39 31	44 5 45	45 32 0	46 58 16
	Sun	E.	77 0 11	75 38 59	74 17 47	72 56 35
14	Antares	W.	100 37 6	102 6 5	103 35 7	105 4 15
	Mars	W.	54 10 4	55 36 35	57 3 11	58 29 52
	α Aquilæ	W.	52 35 18	53 45 16	54 55 56	56 7 15
	Sun	E.	66 10 15	64 48 51	63 27 23	62 5 51
15	Antares	W.	112 31 20	114 1 5	115 30 57	117 0 57
	Mars	W.	65 44 51	67 12 13	68 39 43	70 7 22
	α Aquilæ	W.	62 12 34	63 27 12	64 42 18	65 57 51
	Sun	E.	55 16 53	53 54 47	52 32 33	51 10 12
16	Mars	W.	77 28 5	78 56 45	80 25 38	81 54 43
	α Aquilæ	W.	72 21 51	73 39 47	74 58 5	76 16 42
	Fomalhaut	W.	47 9 47	48 26 41	49 44 21	51 2 43
	Sun	E.	44 16 20	42 53 7	41 29 45	40 6 13
17	Mars	W.	89 23 15	90 53 37	92 24 13	93 55 4
	α Aquilæ	W.	82 54 28	84 14 52	85 35 33	86 56 28
	Fomalhaut	W.	57 44 14	59 6 15	60 28 47	61 51 49
	Sun	E.	33 6 10	31 41 41	30 17 3	28 52 16
22	Sun	W.	27 35 47	29 9 12	30 42 54	32 16 53
	Jupiter	E.	23 8 52	21 28 16	19 47 29	18 6 32
	Saturn	E.	50 35 37	48 54 17	47 12 47	45 31 8
	Regulus	E.	58 25 1	56 43 12	55 1 13	53 19 3
23	Sun	W.	40 10 32	41 45 54	43 21 28	44 57 14
	Saturn	E.	37 0 36	35 18 5	33 35 27	31 52 43
	Regulus	E.	44 45 53	43 2 48	41 19 35	39 36 14
	Spica	E.	98 49 6	97 5 57	95 22 39	93 39 13

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
24	Sun	W.	46° 33′ 10″	48° 9′ 16″	49° 45′ 32″	51° 21′ 57″
	Saturn	E.	30 9 54	28 26 59	26 44 0	25 0 57
	Regulus	E.	37 52 46	36 9 11	34 25 30	32 41 42
	Spica	E.	91 55 38	90 11 54	88 28 2	86 44 2
25	Sun	W.	59 26 11	61 3 26	62 40 48	64 18 17
	Venus	W.	15 22 13	17 0 28	18 38 55	20 17 32
	Regulus	E.	24 1 31	22 17 20	20 33 9	18 49 1
	Spica	E.	78 2 15	76 17 33	74 32 45	72 47 51
26	Sun	W.	72 27 14	74 5 19	75 43 29	77 21 45
	Venus	W.	28 32 51	30 12 17	31 51 51	33 31 30
	Pollux	W.	27 39 48	29 23 13	31 6 56	32 50 54
	Jupiter	W.	24 44 52	26 29 5	28 13 23	29 57 46
	Spica	E.	64 1 57	62 16 31	60 31 1	58 45 27
	Antares	E.	109 48 10	108 2 34	106 16 54	104 31 8
27	Sun	W.	85 34 9	87 12 50	88 51 35	90 30 23
	Pollux	W.	41 33 53	43 18 57	45 4 8	46 49 27
	Venus	W.	41 51 9	43 31 19	45 11 34	46 51 54
	Jupiter	W.	38 40 46	40 25 34	42 10 25	43 55 19
	Spica	E.	49 56 38	48 10 43	46 24 45	44 38 45
	Antares	E.	95 41 15	93 55 5	92 8 52	90 22 36
28	Sun	W.	98 45 6	100 24 9	102 3 14	103 42 20
	Pollux	W.	55 37 24	57 23 13	59 9 5	60 55 0
	Venus	W.	55 14 28	56 55 9	58 35 52	60 16 37
	Jupiter	W.	52 40 31	54 25 40	56 10 50	57 56 3
	Saturn	W.	26 4 59	27 50 25	29 35 56	31 21 33
	Spica	E.	35 48 22	34 2 16	32 16 11	30 30 7
	Antares	E.	81 30 30	79 43 58	77 57 25	76 10 50
29	Sun	W.	111 58 5	113 37 15	115 16 24	116 55 31
	Pollux	W.	69 45 9	71 31 14	73 17 20	75 3 26
	Venus	W.	68 40 55	70 21 50	72 2 45	73 43 41
	Jupiter	W.	66 42 19	68 27 35	70 12 50	71 58 5
	Saturn	W.	40 10 24	41 56 16	43 42 9	45 28 2
	Regulus	W.	32 43 36	34 29 55	36 16 15	38 2 36
	Antares	E.	67 17 39	65 31 0	63 44 21	61 57 42
	Mars	E.	117 35 58	115 50 55	114 5 52	112 20 49
30	Pollux	W.	83 53 43	85 39 41	87 25 37	89 11 29
	Venus	W.	82 8 14	83 49 5	85 29 54	87 10 40
	Jupiter	W.	80 44 0	82 29 5	84 14 6	85 59 4
	Saturn	W.	54 17 21	56 3 8	57 48 52	59 34 34
	Regulus	W.	46 54 19	48 40 36	50 26 50	52 13 2
	Antares	E.	53 4 50	51 18 22	49 31 57	47 45 35
	Mars	E.	103 35 45	101 50 49	100 5 55	98 21 4
31	Venus	W.	95 33 45	97 14 9	98 54 28	100 34 41
	Jupiter	W.	94 42 55	96 27 25	98 11 49	99 56 6
	Saturn	W.	68 22 3	70 7 18	71 52 27	73 37 30
	Regulus	W.	61 3 6	62 48 52	64 34 33	66 20 7
	Antares	E.	38 54 46	37 8 52	35 23 4	33 37 23
	Mars	E.	89 37 42	87 53 16	86 8 55	84 24 41

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
24	Sun	W.	52 58 31	54 35 14	56 12 5	57 49 4
	Saturn	E.	23 17 53	21 34 48	19 51 45	18 8 45
	Regulus	E.	30 57 48	29 13 49	27 29 46	25 45 40
	Spica	E.	84 59 55	83 15 41	81 31 19	79 46 50
25	Sun	W.	65 55 52	67 33 34	69 11 21	70 49 15
	Venus	W.	21 56 19	23 35 16	25 14 20	26 53 32
	Regulus	E.	17 5 0	15 21 10	13 37 35	11 54 21
	Spica	E.	71 2 51	69 17 46	67 32 35	65 47 19
26	Sun	W.	79 0 5	80 38 30	82 16 58	83 55 32
	Venus	W.	35 11 15	36 51 6	38 31 2	40 11 3
	Pollux	W.	34 35 7	36 19 33	38 4 9	39 48 56
	Jupiter	W.	31 42 14	33 26 46	35 11 22	36 56 2
	Spica	E.	56 59 48	55 14 6	53 28 20	51 42 30
	Antares	E.	102 45 17	100 59 22	99 13 24	97 27 22
27	Sun	W.	92 9 14	93 48 8	95 27 5	97 6 4
	Pollux	W.	48 34 52	50 20 23	52 5 58	53 51 39
	Venus	W.	48 32 18	50 12 45	51 53 16	53 33 51
	Jupiter	W.	45 40 16	47 25 16	49 10 19	50 55 24
	Spica	E.	42 52 43	41 6 39	39 20 35	37 34 28
	Antares	E.	88 36 16	86 49 53	85 3 28	83 17 1
28	Sun	W.	105 21 28	107 0 36	108 39 45	110 18 55
	Pollux	W.	62 40 58	64 26 58	66 13 0	67 59 4
	Venus	W.	61 57 26	63 38 16	65 19 7	67 0 0
	Jupiter	W.	59 41 17	61 26 31	63 11 46	64 57 2
	Saturn	W.	33 7 14	34 52 58	36 38 45	38 24 34
	Spica	E.	28 44 5	26 58 6	25 12 12	23 26 23
	Antares	E.	74 24 13	72 37 36	70 50 57	69 4 19
29	Sun	W.	118 34 38	120 13 43	121 52 46	123 31 46
	Pollux	W.	76 49 32	78 35 37	80 21 41	82 7 43
	Venus	W.	75 24 37	77 5 33	78 46 28	80 27 22
	Jupiter	W.	73 43 19	75 28 32	77 13 44	78 58 53
	Saturn	W.	47 13 57	48 59 50	50 45 42	52 31 32
	Regulus	W.	39 48 58	41 35 20	43 21 41	45 8 1
	Antares	E.	60 11 5	58 24 29	56 37 54	54 51 21
	Mars	E.	110 35 47	108 50 45	107 5 43	105 20 43
30	Pollux	W.	90 57 17	93 43 2	94 28 42	96 14 17
	Venus	W.	88 51 25	90 32 6	92 12 43	93 53 16
	Jupiter	W.	87 44 0	89 28 50	91 13 37	92 58 19
	Saturn	W.	61 20 12	63 5 47	64 51 17	66 36 42
	Regulus	W.	53 59 11	55 45 16	57 31 17	59 17 14
	Antares	E.	45 59 16	44 13 1	42 26 51	40 40 46
	Mars	E.	96 36 15	94 51 30	93 6 50	91 22 14
31	Venus	W.	102 14 48	103 54 48	105 34 43	107 14 29
	Jupiter	W.	101 40 17	103 24 20	105 8 15	106 52 2
	Saturn	W.	75 22 26	77 7 15	78 51 56	80 36 29
	Regulus	W.	68 5 35	69 50 55	71 36 8	73 21 14
	Antares	E.	31 51 47	30 6 20	28 21 0	26 35 48
	Mars	E.	82 40 31	80 56 30	79 12 36	77 28 50

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Jupiter	W.	108 35 40	110 19 10	112 2 30	113 45 40
	Venus	W.	108 54 8	110 33 39	112 13 1	113 52 14
	Saturn	W.	82 20 53	84 5 8	85 49 14	87 33 10
	Regulus	W.	75 6 10	76 50 57	78 35 35	80 20 3
	Spica	W.	21 9 38	22 53 32	24 37 25	26 21 14
	Mars	E.	75 45 12	74 1 42	72 18 22	70 35 11
	a Aquilæ	E.	81 9 41	79 38 48	78 8 12	76 37 54
2	Saturn	W.	96 10 2	97 52 48	99 35 21	101 17 41
	Regulus	W.	88 59 42	90 43 2	92 26 9	94 9 3
	Spica	W.	34 58 42	36 41 44	38 24 35	40 7 15
	Mars	E.	62 1 57	60 19 53	58 38 2	56 56 25
	a Aquilæ	E.	69 12 8	67 44 22	66 17 7	64 50 28
	Fomalhaut	E.	93 0 40	91 25 48	89 51 8	88 16 41
3	Saturn	W.	109 45 48	111 26 41	113 7 18	114 47 39
	Regulus	W.	102 40 1	104 21 28	106 2 39	107 43 35
	Spica	W.	48 37 21	50 18 41	51 59 45	53 40 34
	Mars	E.	48 31 45	46 51 35	45 11 40	43 32 1
	a Aquilæ	E.	57 47 15	56 24 57	55 3 34	53 43 7
	Fomalhaut	E.	80 28 7	78 55 17	77 22 47	75 50 38
	a Pegasi	E.	101 42 7	100 4 25	98 26 56	96 49 40
4	Spica	W.	62 0 42	63 39 54	65 18 50	66 57 28
	Mars	E.	35 18 4	33 40 12	32 2 38	30 25 23
	Fomalhaut	E.	68 15 51	66 46 14	65 17 6	63 48 29
	a Pegasi	E.	88 46 59	87 11 15	85 35 48	84 0 38
5	Spica	W.	75 6 21	76 43 15	78 19 52	79 56 12
	Antares	W.	29 16 55	30 53 57	32 30 42	34 7 9
	Fomalhaut	E.	56 33 56	55 8 56	53 44 39	52 21 6
	a Pegasi	E.	76 9 28	74 36 13	73 3 18	71 30 43
	a Arietis	E.	118 35 14	116 58 39	115 22 20	113 46 18
6	Spica	W.	87 53 29	89 28 5	91 2 25	92 36 29
	Antares	W.	42 5 6	43 39 50	45 14 18	46 48 29
	Fomalhaut	E.	45 36 0	44 17 52	43 0 49	41 44 58
	a Pegasi	E.	63 53 13	62 22 50	60 52 50	59 23 14
	a Arietis	E.	105 50 17	104 15 54	102 41 48	101 7 57
7	Spica	W.	100 22 51	101 55 22	103 27 38	104 59 41
	Antares	W.	54 35 29	56 8 7	57 40 32	59 12 42
	a Pegasi	E.	52 1 25	50 34 22	49 7 48	47 41 43
	a Arietis	E.	93 22 36	91 50 17	90 18 12	88 46 22
	Sun	E.	134 35 28	133 10 22	131 45 29	130 20 49
8	Antares	W.	66 50 17	68 21 12	69 51 55	71 22 28
	Mars	W.	15 20 15	16 48 46	18 17 18	19 45 50
	a Pegasi	E.	40 39 18	39 16 38	37 54 39	36 33 24
	a Arietis	E.	81 10 23	79 39 49	78 9 25	76 39 13
	Sun	E.	123 20 31	121 57 2	120 33 44	119 10 36
9	Antares	W.	78 52 47	80 22 26	81 51 59	83 21 24
	Mars	W.	27 8 30	28 36 56	30 5 17	31 33 34
	a Arietis	E.	69 10 36	67 41 19	66 12 10	64 43 7

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Jupiter	W.	115 28 40	117 11 29	118 54 6	120 36 32
	Venus	W.	115 31 18	117 10 11	118 48 54	120 27 26
	Saturn	W.	89 16 55	91 0 29	92 43 52	94 27 3
	Regulus	W.	82 4 22	83 48 30	85 32 26	87 16 10
	Spica	W.	28 4 59	29 48 37	31 32 7	33 15 29
	Mars	E.	68 52 10	67 9 20	65 26 41	63 44 14
	a Aquilæ	E.	75 7 56	73 38 21	72 9 10	70 40 26
2	Saturn	W.	102 59 48	104 41 41	106 23 19	108 4 42
	Regulus	W.	95 51 43	97 34 9	99 16 21	100 58 19
	Spica	W.	41 49 43	43 31 58	45 14 0	46 55 48
	Mars	E.	55 15 1	53 33 50	51 52 53	50 12 12
	a Aquilæ	E.	63 24 25	61 59 2	60 34 21	59 10 24
	Fomalhaut	E.	86 42 27	85 8 27	83 34 43	82 1 16
3	Saturn	W.	116 27 43	118 7 31	119 47 1	121 26 14
	Regulus	W.	109 24 14	111 4 36	112 44 42	114 24 31
	Spica	W.	55 21 8	57 1 26	58 41 27	60 21 13
	Mars	E.	41 52 39	40 13 34	38 34 46	36 56 16
	a Aquilæ	E.	52 23 42	51 5 22	49 48 11	48 32 15
	Fomalhaut	E.	74 18 51	72 47 28	71 16 30	69 45 57
	a Pegasi	E.	95 12 37	93 35 49	91 59 16	90 23 0
4	Spica	W.	68 35 50	70 13 54	71 51 40	73 29 9
	Mars	E.	28 48 29	27 11 56	25 35 44	23 59 55
	Fomalhaut	E.	62 20 23	60 52 52	59 25 56	57 59 36
	a Pegasi	E.	82 25 46	80 51 13	79 16 59	77 43 4
5	Spica	W.	81 32 13	83 7 57	84 43 25	86 18 35
	Antares	W.	35 43 19	37 19 11	38 54 47	40 30 5
	Fomalhaut	E.	50 58 20	49 36 23	48 15 19	46 55 10
	a Pegasi	E.	69 58 30	68 26 37	66 55 7	65 23 59
	a Arietis	E.	112 10 33	110 35 4	108 59 52	107 24 56
6	Spica	W.	94 10 17	95 43 48	97 17 4	98 50 5
	Antares	W.	48 22 24	49 56 4	51 29 27	53 2 36
	Fomalhaut	E.	40 30 21	39 17 6	38 5 17	36 54 58
	a Pegasi	E.	57 54 2	56 25 14	54 56 52	53 28 56
	a Arietis	E.	99 34 21	98 1 2	96 27 59	94 55 9
7	Spica	W.	106 31 29	108 3 4	109 34 26	111 5 36
	Antares	W.	60 44 39	62 16 22	63 47 53	65 19 11
	a Pegasi	E.	46 16 7	44 51 4	43 26 34	42 2 38
	a Arietis	E.	87 14 44	85 43 20	84 12 9	82 41 10
	Sun	E.	128 56 21	127 32 6	126 8 2	124 44 11
8	Antares	W.	72 52 50	74 23 2	75 53 5	77 23 0
	Mars	W.	21 14 22	22 42 54	24 11 26	25 39 59
	a Pegasi	E.	35 12 58	33 53 23	32 34 44	31 17 8
	a Arietis	E.	75 9 10	73 39 18	72 9 35	70 40 2
	Sun	E.	117 47 37	116 24 47	115 2 6	113 39 34
9	Antares	W.	84 50 43	86 19 56	87 49 5	89 18 10
	Mars	W.	33 1 48	34 30 0	35 58 9	37 26 16
	a Arietis	E.	63 14 10	61 45 21	60 16 37	58 47 58

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
9	Sun	E.	112 17 10	110 54 53	109 32 42	108 10 37
10	Antares	W.	90 47 10	92 16 8	93 45 2	95 13 55
	α Aquilæ	W.	45 2 8	46 6 38	47 12 8	48 18 35
	Mars	W.	38 54 21	40 22 25	41 50 29	43 18 34
	α Arietis	E.	57 19 23	55 50 53	54 22 26	52 54 2
	Sun	E.	101 21 33	99 59 55	98 38 20	97 16 47
11	Antares	W.	102 38 6	104 6 59	105 35 53	107 4 50
	α Aquilæ	W.	54 2 45	55 13 39	56 25 9	57 37 14
	Mars	W.	50 39 2	52 7 14	53 35 29	55 3 48
	α Arietis	E.	45 32 33	44 4 18	42 36 3	41 7 47
	Sun	E.	90 29 9	89 7 35	87 45 59	86 24 20
12	α Aquilæ	W.	63 45 12	65 0 10	66 15 32	67 31 19
	Mars	W.	62 26 38	63 55 31	65 24 31	66 53 39
	Fomalhaut	W.	39 7 18	40 17 3	41 27 58	42 39 56
	α Arietis	E.	33 46 14	32 17 52	30 49 28	29 21 3
	Sun	E.	79 35 4	78 12 56	76 50 41	75 28 19
13	Mars	W.	74 21 43	75 51 52	77 22 13	78 52 47
	α Aquilæ	W.	73 55 47	75 13 42	76 31 57	77 50 32
	Fomalhaut	W.	48 53 27	50 10 32	51 28 19	52 46 47
	Sun	E.	68 34 21	67 11 4	65 47 36	64 23 56
14	Mars	W.	86 28 56	88 0 54	89 33 7	91 5 35
	α Aquilæ	W.	84 27 51	85 48 9	87 8 42	88 29 32
	Fomalhaut	W.	59 28 6	60 50 1	62 12 27	63 35 23
	α Pegasi	W.	36 45 27	38 8 24	39 32 9	40 56 39
	Sun	E.	57 22 27	55 57 28	54 32 15	53 6 45
15	Mars	W.	98 52 9	100 26 20	102 0 49	103 35 37
	α Aquilæ	W.	95 17 7	96 39 15	98 1 34	99 24 4
	Fomalhaut	W.	70 37 3	72 2 43	73 28 47	75 55 15
	α Pegasi	W.	48 9 23	49 37 44	51 6 39	52 36 5
	Sun	E.	45 55 26	44 28 20	43 0 58	41 33 18
16	Fomalhaut	W.	82 13 27	83 42 11	85 11 15	86 40 40
	α Pegasi	W.	60 10 45	61 43 5	63 15 52	64 49 4
	Sun	E.	34 10 37	32 41 12	31 11 29	29 41 30
21	Sun	W.	29 44 43	31 24 11	33 3 47	34 43 31
	Spica	E.	81 55 5	80 8 8	78 21 7	76 33 59
22	Sun	W.	43 3 38	44 43 52	46 24 9	48 4 27
	Jupiter	W.	15 52 23	17 38 27	19 24 33	21 10 40
	Spica	E.	67 37 26	65 49 59	64 2 31	62 15 3
	Antares	E.	113 23 32	111 35 54	109 48 16	108 0 36
23	Sun	W.	56 26 7	58 6 25	59 46 41	61 26 56
	Jupiter	W.	30 1 11	31 47 13	33 33 14	35 19 12
	Venus	W.	24 15 20	26 1 41	27 48 3	29 34 23
	Spica	E.	53 17 50	51 30 29	49 43 10	47 55 54
	Antares	E.	99 2 17	97 14 40	95 27 6	93 39 35

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
9	Sun	E.	106 48 39	105 26 46	104 4 58	102 43 14
10	Antares	W.	96 42 45	98 11 35	99 40 25	101 9 15
	α Aquilæ	W.	49 25 54	50 34 1	51 42 54	52 52 29
	Mars	W.	44 46 37	46 14 41	47 42 46	49 10 53
	α Arietis	E.	51 25 40	49 57 21	48 29 4	47 0 48
	Sun	E.	95 55 15	94 33 44	93 12 13	91 50 41
11	Antares	W.	108 33 50	110 2 54	111 32 3	113 1 17
	α Aquilæ	W.	58 49 51	60 2 59	61 16 35	62 30 40
	Mars	W.	56 32 12	58 0 40	59 29 13	60 57 52
	α Arietis	E.	39 39 31	38 11 14	36 42 55	35 14 35
	Sun	E.	85 2 38	83 40 52	82 19 1	80 57 5
12	α Aquilæ	W.	68 47 29	70 4 1	71 20 55	72 38 10
	Mars	W.	68 22 56	69 52 23	71 21 59	72 51 46
	Fomalhaut	W.	43 52 53	45 6 46	46 21 31	47 37 6
	α Arietis	E.	27 52 38	26 24 13	24 55 49	23 27 27
	Sun	E.	74 5 50	72 43 12	71 20 25	69 57 28
13	Mars	W.	80 23 33	81 54 32	83 25 45	84 57 13
	α Aquilæ	W.	79 9 25	80 28 35	81 48 4	83 7 49
	Fomalhaut	W.	54 5 52	55 25 34	56 45 51	58 6 42
	Sun	E.	63 0 4	61 36 0	60 11 43	58 47 12
14	Mars	W.	92 38 20	94 11 22	95 44 41	97 18 16
	α Aquilæ	W.	89 50 36	91 11 54	92 33 25	93 55 10
	Fomalhaut	W.	64 58 48	66 22 42	67 47 3	69 11 49
	α Pegasi	W.	42 21 54	43 47 49	45 14 24	46 41 35
	Sun	E.	51 41 1	50 15 2	48 48 47	47 22 15
15	Mars	W.	105 10 43	106 46 9	108 21 53	109 57 55
	α Aquilæ	W.	100 46 44	102 9 32	103 32 28	104 55 30
	Fomalhaut	W.	76 22 8	77 49 24	79 17 3	80 45 3
	α Pegasi	W.	54 6 2	55 36 29	57 7 26	58 38 52
	Sun	E.	40 5 21	38 37 6	37 8 33	35 39 44
16	Fomalhaut	W.	88 10 24	89 40 27	91 10 47	92 41 26
	α Pegasi	W.	66 22 43	67 56 45	69 31 13	71 6 5
	Sun	E.	28 11 14	26 40 42	25 9 54	23 38 51
21	Sun	W.	36 23 22	38 3 19	39 43 21	41 23 28
	Spica	E.	74 46 48	72 59 32	71 12 12	69 24 50
22	Sun	W.	49 44 46	51 25 7	53 5 27	54 45 47
	Jupiter	W.	22 56 47	24 42 54	26 29 1	28 15 7
	Spica	E.	60 27 35	58 40 7	56 52 40	55 5 14
	Antares	E.	106 12 56	104 25 15	102 37 35	100 49 56
23	Sun	W.	63 7 8	64 47 17	66 27 23	68 7 26
	Jupiter	W.	37 5 7	38 50 59	40 36 47	42 22 32
	Venus	W.	31 20 44	33 7 3	34 53 21	36 39 36
	Spica	E.	46 8 42	44 21 35	42 34 32	40 47 35
	Antares	E.	91 52 5	90 4 39	88 17 17	86 30 0

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
24	Sun	W.	69 47 24	71 27 18	73 7 8	74 46 52
	Jupiter	W.	44 8 12	45 53 47	47 39 18	49 24 43
	Venus	W.	38 25 50	40 12 0	41 58 8	43 44 13
	Saturn	W.	20 46 37	22 31 53	24 17 13	26 2 35
	Spica	E.	39 0 44	37 13 59	35 27 22	33 40 51
	Antares	E.	84 42 45	82 55 36	81 8 32	79 21 32
25	Sun	W.	83 4 14	84 43 24	86 22 28	88 1 24
	Jupiter	W.	58 10 24	59 55 12	61 39 54	63 24 30
	Venus	W.	52 33 43	54 19 24	56 5 0	57 50 33
	Saturn	W.	34 49 19	36 34 31	38 19 38	40 4 40
	Antares	E.	70 28 0	68 41 37	66 55 20	65 9 11
	Mars	E.	122 2 21	120 15 33	118 28 49	116 42 11
26	Sun	W.	96 14 15	97 52 27	99 30 31	101 8 27
	Jupiter	W.	72 5 38	73 49 28	75 33 10	77 16 44
	Venus	W.	66 36 54	68 21 53	70 6 47	71 51 34
	Saturn	W.	48 48 20	50 32 44	52 17 0	54 1 9
	Regulus	W.	43 40 2	45 25 12	47 10 15	48 55 11
	Antares	E.	56 20 10	54 34 46	52 49 30	51 4 21
	Mars	E.	107 50 32	106 4 32	104 18 39	102 32 53
27	Sun	W.	109 16 1	110 53 6	112 30 2	114 6 49
	Jupiter	W.	85 52 28	87 35 11	89 17 44	90 0 9
	Venus	W.	80 33 57	82 18 6	84 2 8	85 46 3
	Saturn	W.	62 39 58	64 23 19	66 6 31	67 49 35
	Regulus	W.	57 37 54	59 22 2	61 6 1	62 49 52
	Antares	E.	42 20 43	40 36 26	38 52 17	37 8 17
	Mars	E.	93 45 59	92 1 0	90 16 10	88 31 28
	α Aquilæ	E.	96 27 1	94 56 18	93 25 39	91 55 5
28	Sun	W.	122 8 25	123 44 16	125 19 57	126 55 27
	Jupiter	W.	99 29 54	101 11 23	102 52 41	104 33 50
	Venus	W.	94 23 52	96 7 3	97 50 7	99 33 4
	Saturn	W.	76 22 38	78 4 47	79 46 46	81 28 35
	Regulus	W.	71 26 52	73 9 48	74 52 35	76 35 12
	Mars	E.	79 50 8	78 6 20	76 22 40	74 39 11
	α Aquilæ	E.	84 24 14	82 54 37	81 25 14	79 56 7
	Fomalhaut	E.	109 0 40	107 27 14	105 53 47	104 20 19
29	Venus	W.	108 5 47	109 47 55	111 29 54	113 11 44
	Saturn	W.	89 55 9	91 35 57	93 16 34	94 57 1
	Regulus	W.	85 5 46	86 47 22	88 28 48	90 10 3
	Spica	W.	31 5 53	32 47 5	34 28 8	36 9 3
	Mars	E.	66 4 15	64 21 47	62 39 30	60 57 23
	α Aquilæ	E.	72 35 6	71 8 0	69 41 20	68 15 6
	Fomalhaut	E.	96 33 37	95 0 31	93 27 33	91 54 42
30	Saturn	W.	103 16 27	104 55 46	106 34 53	108 13 49
	Spica	W.	44 31 21	46 11 19	47 51 6	49 30 42
	Mars	E.	52 29 46	50 48 51	49 8 9	47 27 39
	α Aquilæ	E.	61 11 55	59 49 7	58 27 2	57 5 41
	Fomalhaut	E.	84 13 2	82 41 19	81 9 49	79 38 34
	α Pegasi	E.	105 40 36	104 4 12	102 27 56	100 51 49

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
24	Sun	W.	76 26 32	78 6 6	79 45 34	81 24 57
	Jupiter	W.	51 10 3	52 55 17	54 40 26	56 25 28
	Venus	W.	45 30 15	47 16 13	49 2 7	50 47 57
	Saturn	W.	27 47 59	29 33 22	31 18 44	33 4 3
	Spica	E.	31 54 29	30 8 17	28 22 14	26 36 21
	Antares	E.	77 34 38	75 47 50	74 1 7	72 14 30
25	Sun	W.	89 40 12	91 18 54	92 57 28	94 35 50
	Jupiter	W.	65 8 58	66 53 19	68 37 33	70 21 40
	Venus	W.	59 36 0	61 21 21	63 6 37	64 51 48
	Saturn	W.	41 49 36	43 34 26	45 19 11	47 3 49
	Antares	E.	63 23 7	61 37 12	59 51 24	58 5 43
	Mars	E.	114 55 39	113 9 13	111 22 53	109 36 39
26	Sun	W.	102 46 14	104 23 53	106 1 24	107 38 47
	Jupiter	W.	79 0 10	80 43 27	82 26 36	84 9 37
	Venus	W.	73 36 15	75 20 50	77 5 19	78 49 42
	Saturn	W.	55 45 11	57 29 5	59 12 51	60 56 29
	Regulus	W.	50 40 0	52 24 40	54 9 12	55 53 37
	Antares	E.	49 19 20	47 34 28	45 39 45	44 5 10
	Mars	E.	100 47 15	99 1 44	97 16 21	95 31 6
27	Sun	W.	115 43 27	117 19 56	118 56 15	120 32 25
	Jupiter	W.	92 42 25	94 24 31	96 6 28	97 48 16
	Venus	W.	87 29 51	89 13 32	90 57 6	92 40 32
	Saturn	W.	69 32 30	71 15 16	72 57 52	74 40 20
	Regulus	W.	64 33 34	66 17 7	68 0 31	69 43 46
	Antares	E.	35 24 26	33 40 45	31 57 14	30 13 51
	Mars	E.	86 46 54	85 2 29	83 18 13	81 34 6
	α Aquilæ	E.	90 24 36	88 54 16	87 24 4	85 54 3
28	Sun	W.	128 30 48	130 5 59	131 40 59	133 15 49
	Jupiter	W.	106 14 49	107 55 38	109 36 17	111 16 45
	Venus	W.	101 15 53	102 58 33	104 41 6	106 23 31
	Saturn	W.	83 10 14	84 51 43	86 33 2	88 14 11
	Regulus	W.	78 17 39	79 59 56	81 42 2	83 23 59
	Mars	E.	72 55 52	71 12 42	69 29 43	67 46 54
	α Aquilæ	E.	78 27 15	76 58 42	75 30 29	74 2 36
	Fomalhaut	E.	102 46 52	101 13 27	99 40 6	98 6 49
29	Venus	W.	114 53 26	116 34 58	118 16 22	119 57 37
	Saturn	W.	96 37 17	98 17 21	99 57 15	101 36 57
	Regulus	W.	91 51 7	93 32 0	95 12 41	96 53 12
	Spica	W.	37 49 50	39 30 27	41 50 55	42 51 13
	Mars	E.	59 15 28	57 33 45	55 52 13	54 10 53
	α Aquilæ	E.	66 49 21	65 24 8	63 59 28	62 35 23
	Fomalhaut	E.	90 22 1	88 49 29	87 17 8	85 44 59
30	Saturn	W.	109 52 33	111 31 4	113 9 23	114 47 30
	Spica	W.	51 10 8	52 49 22	54 28 25	56 7 16
	Mars	E.	45 47 24	44 7 22	42 27 35	40 48 2
	α Aquilæ	E.	55 45 8	54 25 26	53 6 39	51 48 49
	Fomalhaut	E.	78 7 37	76 36 56	75 6 33	73 36 29
	α Pegasi	E.	99 15 51	97 40 2	96 4 22	94 28 53

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Spica	W.	57 45 56	59 24 24	61 2 39	62 40 43
	Antares	W.	11 54 47	13 33 25	15 11 51	16 50 4
	Mars	E.	39 8 47	37 29 45	35 51 0	34 12 32
	a Aquilæ	E.	50 32 2	49 16 21	48 1 51	46 48 36
	Fomalhaut	E.	72 6 46	70 37 22	69 8 21	67 39 43
	a Pegasi	E.	92 53 35	91 18 28	89 43 33	88 8 50
2	Spica	W.	70 47 53	72 24 41	74 1 16	75 37 38
	Antares	W.	24 58 2	26 34 59	28 11 43	29 48 14
	Mars	E.	26 5 14	24 28 58	22 53 11	21 17 56
	Fomalhaut	E.	60 23 7	58 57 16	57 31 58	56 7 16
	a Pegasi	E.	80 18 33	78 45 11	77 12 5	55 39 14
	a Arietis	E.	122 53 4	121 16 34	119 40 16	118 4 11
3	Spica	W.	83 36 11	85 11 13	86 46 3	88 20 39
	Antares	W.	37 47 30	39 22 41	40 57 39	42 32 24
	Fomalhaut	E.	49 13 45	47 53 21	46 33 50	45 15 15
	a Pegasi	E.	67 59 3	66 27 53	64 57 1	63 26 28
	a Arietis	E.	110 6 52	108 32 3	106 57 26	105 23 2
4	Spica	W.	96 10 27	97 43 46	99 16 51	100 49 44
	Antares	W.	50 22 52	51 56 19	53 29 33	55 2 35
	Fomalhaut	E.	38 58 59	37 47 41	36 37 57	35 29 53
	a Pegasi	E.	55 58 49	54 30 22	53 2 19	51 34 40
	a Arietis	E.	97 34 12	96 1 4	94 28 9	92 55 27
5	Spica	W.	108 31 7	110 2 48	111 34 17	113 5 36
	Antares	W.	62 44 41	64 16 31	65 48 9	67 19 37
	Mars	W.	13 43 26	15 10 47	16 39 6	18 8 5
	a Pegasi	E.	44 23 9	42 58 21	41 34 8	40 10 31
	a Arietis	E.	85 14 54	83 43 23	82 12 3	80 40 55
	Aldebaran	E.	117 22 48	115 52 37	114 22 35	112 52 42
6	Antares	W.	74 54 19	76 24 46	77 55 4	79 25 14
	Mars	W.	25 37 46	27 8 4	28 38 24	30 8 44
	a Arietis	E.	73 7 50	71 37 43	70 7 45	68 37 56
	Aldebaran	E.	105 25 21	103 56 18	102 27 22	100 58 34
7	Antares	W.	86 54 4	88 23 29	89 52 49	91 22 3
	a Aquilæ	W.	42 13 39	43 15 21	44 18 20	45 22 25
	Mars	W.	37 40 25	39 10 41	40 40 54	42 11 6
	a Arietis	E.	61 10 57	59 41 56	58 13 1	56 44 13
	Aldebaran	E.	93 36 19	92 8 11	90 40 9	89 12 13
	Sun	E.	130 57 25	129 35 11	128 13 3	126 50 59
8	Antares	W.	98 47 5	100 15 55	101 44 43	103 13 30
	a Aquilæ	W.	50 56 49	52 6 4	53 15 58	54 26 29
	Mars	W.	49 41 40	51 11 43	52 41 46	54 11 49
	a Arietis	E.	49 21 31	47 53 12	46 24 57	44 56 45
	Aldebaran	E.	81 53 39	80 26 7	78 58 38	77 31 11
	Sun	E.	120 1 48	118 40 7	117 18 29	115 56 52
9	Antares	W.	110 37 17	112 6 4	113 34 54	115 3 46
	Mars	W.	61 42 21	63 12 33	64 42 49	66 13 8
	a Aquilæ	W.	60 27 3	61 40 34	62 54 30	64 8 50

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Spica	W.	64 18 34	65 56 13	67 33 39	69 10 52
	Antares	W.	18 28 5	20 5 53	21 43 29	23 20 52
	Mars	E.	32 34 22	30 56 33	29 19 4	27 41 56
	α Aquilæ	E.	45 36 41	44 26 13	43 17 18	42 10 2
	Fomalhaut	E.	66 11 30	64 43 42	63 16 21	61 49 29
	α Pegasi	E.	86 34 20	85 0 3	83 25 59	81 52 9
2	Spica	W.	77 13 47	78 49 43	80 25 25	82 0 55
	Antares	W.	31 24 32	33 0 36	34 36 27	36 12 5
	Mars	E.	19 43 19	18 9 27	16 36 27	15 4 32
	Fomalhaut	E.	54 43 11	53 19 44	51 56 59	50 34 59
	α Pegasi	E.	74 6 38	72 34 19	71 2 17	69 30 31
	α Arietis	E.	116 28 18	114 52 38	113 17 10	111 41 55
3	Spica	W.	89 55 3	91 29 13	93 3 11	94 36 55
	Antares	W.	44 6 56	45 41 14	47 15 20	48 49 12
	Fomalhaut	E.	43 57 40	42 41 10	41 25 50	40 11 44
	α Pegasi	E.	61 56 15	60 26 22	58 56 49	57 27 38
	α Arietis	E.	103 48 50	102 14 52	100 41 6	99 7 33
4	Spica	W.	102 22 25	103 54 54	105 27 10	106 59 14
	Antares	W.	56 35 25	58 8 2	59 40 27	61 12 40
	Fomalhaut	E.	34 23 40	33 19 26	32 17 21	31 17 39
	α Pegasi	E.	50 7 27	48 40 39	47 14 19	45 48 29
	α Arietis	E.	91 22 56	89 50 38	88 18 31	86 46 37
5	Spica	W.	114 36 43	116 7 39	117 38 25	119 9 1
	Antares	W.	68 50 54	70 22 0	71 52 56	73 23 43
	Mars	W.	19 37 32	21 7 20	22 37 21	24 7 31
	α Pegasi	E.	38 47 32	37 25 16	36 3 45	34 43 4
	α Arietis	E.	79 9 57	77 39 10	76 8 33	74 38 7
	Aldebaran	E.	111 22 57	109 53 21	108 23 53	106 54 33
6	Antares	W.	80 55 15	82 25 8	83 54 54	85 24 32
	Mars	W.	31 39 5	33 9 26	34 39 47	36 10 7
	α Arietis	E.	67 8 16	65 38 44	64 9 21	62 40 5
	Aldebaran	E.	99 29 53	98 1 20	96 32 53	95 4 33
7	Antares	W.	92 51 12	94 20 16	95 49 16	97 18 12
	α Aquilæ	W.	46 27 32	47 33 36	48 40 32	49 48 17
	Mars	W.	43 41 16	45 11 24	46 41 31	48 11 36
	α Arietis	E.	55 15 30	53 46 53	52 18 21	50 49 54
	Aldebaran	E.	87 44 21	86 16 34	84 48 52	83 21 14
	Sun	E.	125 29 1	124 7 7	122 45 17	121 23 31
8	Antares	W.	104 42 16	106 11 1	107 39 46	109 8 31
	α Aquilæ	W.	55 37 33	56 49 10	58 1 19	59 13 57
	Mars	W.	55 41 53	57 11 58	58 42 4	60 12 11
	α Arietis	E.	43 28 37	42 0 31	40 32 28	39 4 26
	Aldebaran	E.	76 3 47	74 36 24	73 9 3	71 41 43
	Sun	E.	114 35 16	113 13 40	111 52 5	110 30 29
9	Antares	W.	116 32 42	118 1 41	119 30 45	120 59 54
	Mars	W.	67 43 31	69 13 59	70 44 32	72 15 10
	α Aquilæ	W.	65 23 33	66 38 37	67 54 2	69 9 47

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
9	Fomalhaut	W.	36 15 41	37 21 36	38 28 52	39 37 23
	a Arietis	E.	37 36 27	36 8 29	34 40 33	33 12 38
	Aldebaran	E.	70 14 23	68 47 3	67 19 43	65 52 22
	Sun	E.	109 8 52	107 47 14	106 25 33	105 3 50
10	Mars	W.	73 45 55	75 16 47	76 47 46	78 18 53
	a Aquilæ	W.	70 25 52	71 42 15	72 58 56	74 15 54
	Fomalhaut	W.	45 35 27	46 49 43	48 4 43	49 20 27
	a Arietis	E.	25 53 32	24 25 51	22 58 16	21 30 49
	Aldebaran	E.	58 35 15	57 7 43	55 40 8	54 12 30
	Sun	E.	98 14 12	96 52 0	95 29 42	94 7 17
11	Mars	W.	85 56 45	87 28 50	89 1 7	90 33 37
	a Aquilæ	W.	80 44 55	82 3 30	83 22 20	84 41 24
	Fomalhaut	W.	55 48 35	57 7 55	58 27 46	59 48 7
	a Pegasi	W.	32 58 35	34 48 4	35 38 29	36 59 47
	Aldebaran	E.	46 53 26	45 25 29	43 57 27	42 29 21
	Sun	E.	87 12 55	85 49 32	84 25 58	83 2 12
12	Mars	W.	98 19 27	99 53 21	101 27 31	103 1 57
	a Aquilæ	W.	91 20 15	92 40 40	94 1 18	95 22 7
	Fomalhaut	W.	66 36 59	68 0 6	69 23 38	70 47 36
	a Pegasi	W.	43 57 27	45 22 57	46 49 2	48 15 41
	Aldebaran	E.	35 8 38	33 40 34	32 12 36	30 44 46
	Sun	E.	76 0 2	74 34 52	73 9 26	71 43 43
13	Mars	W.	110 58 26	112 34 39	114 11 11	115 48 2
	a Aquilæ	W.	102 8 51	103 30 40	104 52 36	106 14 38
	Fomalhaut	W.	77 53 32	79 19 54	80 46 39	82 13 47
	a Pegasi	W.	55 36 53	57 6 37	58 36 50	60 7 32
	Sun	E.	64 30 45	63 3 13	61 35 21	60 7 9
14	*a* Aquilæ	W.	113 5 51	114 28 8	115 50 22	117 12 31
	Fomalhaut	W.	89 34 53	91 4 10	92 33 47	94 3 44
	a Pegasi	W.	67 47 59	69 21 26	70 55 19	72 29 39
	a Arietis	W.	24 18 5	25 53 44	27 29 57	29 6 42
	Sun	E.	52 40 55	51 10 35	49 39 52	48 8 46
15	Fomalhaut	W.	101 38 0	103 9 41	104 41 38	106 13 45
	a Pegasi	W.	80 27 48	82 4 41	83 41 59	85 19 41
	a Arietis	W.	37 18 1	38 57 41	40 37 49	42 18 23
	Sun	E.	40 27 30	38 54 4	37 20 15	35 46 2
20	Sun	W.	26 4 51	27 48 31	29 32 11	31 15 51
	Spica	E.	57 56 34	56 5 59	54 15 24	52 24 51
	Antares	E.	103 41 28	101 50 39	99 59 49	98 9 1
21	Sun	W.	39 53 30	41 36 48	43 19 59	45 3 3
	Spica	E.	43 13 3	41 22 59	39 33 3	37 43 15
	Antares	E.	88 55 40	87 5 14	85 14 54	83 24 42
	Mars	E.	134 25 44	132 34 1	130 42 25	128 50 56
22	Sun	W.	53 36 15	55 18 23	57 0 20	58 42 6
	Spica	E.	28 37 13	26 48 42	25 0 29	23 12 37
	Antares	E.	74 15 49	72 26 33	70 37 28	68 48 34

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
9	Fomalhaut	W.	40 47 1	41 57 43	43 9 24	44 22 0
	α Arietis	E.	31 44 45	30 16 53	28 49 3	27 21 16
	Aldebaran	E.	64 25 0	62 57 37	61 30 12	60 2 45
	Sun	E.	103 42 3	102 20 12	100 58 17	99 36 17
10	Mars	W.	79 50 8	81 21 32	82 53 6	84 24 50
	α Aquilæ	W.	75 33 10	76 50 42	78 8 31	79 26 35
	Fomalhaut	W.	50 36 51	51 53 54	53 11 33	54 29 47
	α Arietis	E.	20 3 31	18 36 27	17 9 43	15 43 24
	Aldebaran	E.	52 44 48	51 17 3	49 49 14	48 21 22
	Sun	E.	92 44 43	91 22 1	89 59 9	88 36 7
11	Mars	W.	92 6 19	93 39 15	95 12 24	96 45 48
	α Aquilæ	W.	86 0 43	87 20 16	88 40 3	90 0 2
	Fomalhaut	W.	61 8 58	62 30 17	63 52 4	65 14 18
	α Pegasi	W.	38 21 53	39 44 45	41 8 20	42 32 35
	Aldebaran	E.	41 1 13	39 33 3	38 4 53	36 36 45
	Sun	E.	81 38 13	80 14 1	78 49 36	77 24 56
12	Mars	W.	104 36 39	106 11 39	107 46 57	109 22 32
	α Aquilæ	W.	96 43 7	98 4 18	99 25 40	100 47 11
	Fomalhaut	W.	72 11 59	73 36 46	75 1 58	76 27 33
	α Pegasi	W.	49 41 53	51 10 37	52 38 52	54 7 37
	Aldebaran	E.	29 17 8	27 49 46	26 22 45	24 56 11
	Sun	E.	70 17 43	68 51 26	67 24 51	65 57 57
13	Mars	W.	117 25 13	119 2 44	120 40 36	122 18 48
	α Aquilæ	W.	107 36 46	108 58 59	110 21 15	111 43 33
	Fomalhaut	W.	83 41 17	85 9 9	86 37 22	88 5 57
	α Pegasi	W.	61 38 42	63 10 20	64 42 26	66 14 59
	Sun	E.	58 38 37	57 9 44	55 40 29	54 10 53
14	α Aquilæ	W.	118 34 33	119 56 26	121 18 6	122 39 30
	Fomalhaut	W.	95 33 59	97 4 33	98 35 26	100 6 35
	α Pegasi	W.	74 4 25	75 39 37	77 15 15	78 51 19
	α Arietis	W.	30 43 59	32 21 46	34 0 2	35 38 47
	Sun	E.	46 37 17	45 5 25	43 33 10	42 0 32
15	Fomalhaut	W.	107 46 5	109 18 38	110 51 18	112 24 2
	α Pegasi	W.	86 57 46	88 36 14	90 15 6	91 54 21
	α Arietis	W.	43 59 24	45 40 51	47 22 43	49 5 1
	Sun	E.	34 11 26	32 36 26	31 1 3	29 25 16
20	Sun	W.	32 59 29	34 43 5	36 26 38	38 10 6
	Spica	E.	50 34 21	48 43 54	46 53 31	45 3 14
	Antares	E.	96 18 14	94 27 30	92 36 49	90 46 12
21	Sun	W.	46 46 0	48 28 48	50 11 27	51 53 56
	Spica	E.	35 53 39	34 4 14	32 15 0	30 26 0
	Antares	E.	81 34 37	79 44 41	77 54 54	76 5 16
	Mars	E.	126 59 34	125 8 20	123 17 14	121 26 17
22	Sun	W.	60 23 39	62 4 59	63 46 6	65 26 59
	Spica	E.	21 25 5	19 37 57	17 51 18	16 5 13
	Antares	E.	66 59 53	65 11 25	63 23 10	61 35 8

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
22	Mars	E.	119 35 29	117 44 50	115 54 21	114 4 3
23	Sun	W.	67 7 39	68 48 4	70 28 15	72 8 11
	Antares	E.	59 47 20	57 59 46	56 12 27	54 25 23
	Mars	E.	104 55 25	103 6 22	101 17 31	99 28 54
	α Aquilæ	E.	111 30 52	109 59 17	108 27 35	106 55 48
24	Sun	W.	80 24 7	82 2 32	83 40 41	85 18 34
	Antares	E.	45 33 46	43 48 14	42 2 57	40 17 56
	Mars	E.	90 29 39	88 42 35	86 55 46	85 9 15
	α Aquilæ	E.	99 16 42	97 45 3	96 13 32	94 42 9
25	Sun	W.	93 24 0	95 0 17	96 36 19	98 12 5
	Spica	W.	14 31 54	16 13 3	17 54 21	19 35 45
	Antares	E.	31 36 50	29 53 24	28 10 14	26 27 20
	Mars	E.	76 20 38	74 35 45	72 51 7	71 6 46
	α Aquilæ	E.	87 8 10	85 38 5	84 8 18	82 38 49
	Fomalhaut	E.	111 47 41	110 14 19	108 40 59	107 7 41
26	Sun	W.	106 7 3	107 41 17	109 15 15	110 48 59
	Spica	W.	28 1 29	29 42 11	31 22 42	33 3 2
	Mars	E.	62 29 8	60 46 26	59 4 0	57 21 51
	α Aquilæ	E.	75 16 38	73 49 23	72 22 34	70 56 13
	Fomalhaut	E.	99 22 35	97 49 57	96 17 29	94 45 11
	α Pegasi	E.	121 33 14	119 56 48	118 20 27	116 44 11
27	Sun	W.	118 33 59	120 6 16	121 38 19	123 10 8
	Spica	W.	41 21 38	43 0 43	44 39 36	46 18 16
	Mars	E.	48 55 11	47 14 41	45 34 28	43 54 32
	α Aquilæ	E.	63 52 13	62 29 9	61 6 45	59 45 1
	Fomalhaut	E.	87 6 43	85 35 42	84 4 55	82 34 24
	α Pegasi	E.	108 44 36	107 9 6	105 33 46	103 58 35
28	Spica	W.	54 28 30	56 5 55	57 43 9	59 20 10
	Mars	E.	35 39 12	34 1 4	32 23 16	30 45 49
	α Aquilæ	E.	53 8 3	51 51 19	50 35 37	49 20 58
	Fomalhaut	E.	75 6 2	73 37 17	72 8 52	70 40 48
	α Pegasi	E.	96 5 13	94 31 6	92 57 10	91 23 25
29	Spica	W.	67 22 17	68 58 7	70 33 46	72 9 14
	Antares	W.	21 31 58	23 7 58	24 43 47	26 19 24
	Fomalhaut	E.	63 26 13	62 0 34	60 35 22	59 10 41
	α Pegasi	E.	83 37 41	82 5 9	80 32 50	79 0 44
30	Spica	W.	80 3 46	81 38 7	83 12 18	84 46 18
	Antares	W.	34 14 41	35 49 11	37 23 30	38 57 39
	Fomalhaut	E.	52 15 30	50 54 21	49 33 54	48 14 14
	α Pegasi	E.	71 23 39	69 52 57	68 22 29	66 52 17
	α Arietis	E.	113 39 11	112 5 3	110 31 5	108 57 17
31	Spica	W.	92 33 44	94 6 43	95 39 31	97 12 10
	Antares	W.	46 45 47	48 18 54	49 51 51	51 24 38
	α Pegasi	E.	59 25 19	57 56 47	56 28 34	55 0 40
	α Arietis	E.	101 10 51	99 38 3	98 5 25	96 32 57

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
22	Mars	E.	112 13 56	110 24 0	108 34 16	106 44 44
23	Sun	W.	73 47 53	75 27 19	77 6 31	78 45 27
	Antares	E.	52 38 33	50 51 58	49 5 39	47 19 35
	Mars	E.	97 40 32	95 52 26	94 4 34	92 16 59
	α Aquilæ	E.	105 23 58	103 52 7	102 20 16	100 48 27
24	Sun	W.	86 56 11	88 33 32	90 10 37	91 47 26
	Antares	E.	38 33 11	36 48 42	35 4 29	33 20 32
	Mars	E.	83 22 59	81 37 0	79 51 17	78 5 49
	α Aquilæ	E.	93 10 56	91 39 55	90 9 6	88 38 31
25	Sun	W.	99 47 36	101 22 51	102 57 50	104 32 34
	Spica	W.	21 17 6	22 58 24	24 39 34	26 20 36
	Antares	E.	24 44 41	23 2 18	21 20 11	19 38 19
	Mars	E.	69 22 41	67 38 54	65 55 22	64 12 7
	α Aquilæ	E.	81 9 39	79 40 50	78 12 23	76 44 18
	Fomalhaut	E.	105 34 27	104 1 19	102 28 17	100 55 22
26	Sun	W.	112 22 28	113 55 42	115 28 42	117 1 28
	Spica	W.	34 43 10	36 23 6	38 2 49	39 42 20
	Mars	E.	55 39 58	53 58 22	52 17 2	50 35 59
	α Aquilæ	E.	69 30 20	68 4 58	66 40 9	65 15 53
	Fomalhaut	E.	93 13 5	91 41 10	90 9 28	88 37 59
	α Pegasi	E.	115 8 1	113 31 58	111 56 3	110 20 15
27	Sun	W.	124 41 44	126 13 6	127 44 15	129 15 11
	Spica	W.	47 56 44	49 34 59	51 13 2	52 50 52
	Mars	E.	42 14 52	40 35 30	38 56 25	37 17 40
	α Aquilæ	E.	58 24 1	57 3 46	55 44 19	54 25 44
	Fomalhaut	E.	81 4 9	79 34 11	78 4 30	76 35 7
	α Pegasi	E.	102 23 34	100 48 43	99 14 2	97 39 32
28	Spica	W.	60 56 59	62 33 36	64 10 1	65 46 15
	Mars	E.	29 8 43	27 32 2	25 55 47	24 19 59
	α Aquilæ	E.	48 7 28	46 55 12	45 44 13	44 34 37
	Fomalhaut	E.	69 13 6	67 45 46	66 18 50	64 52 19
	α Pegasi	E.	89 49 52	88 16 31	86 43 22	85 10 25
29	Spica	W.	73 44 31	75 19 36	76 54 30	78 29 14
	Antares	W.	27 54 50	29 30 5	31 5 8	32 40 0
	Fomalhaut	E.	57 46 30	56 22 51	54 59 47	53 37 19
	α Pegasi	E.	77 28 52	75 57 13	74 25 47	72 54 36
30	Spica	W.	86 20 8	87 53 48	89 27 17	91 0 36
	Antares	W.	40 31 37	42 5 25	43 39 3	45 12 30
	Fomalhaut	E.	46 55 23	45 37 23	44 20 20	43 4 17
	α Pegasi	E.	65 22 21	63 52 40	62 23 16	60 54 9
	α Arietis	E.	107 23 40	105 50 13	104 16 56	102 43 48
31	Spica	W.	98 44 39	100 16 58	101 49 8	103 21 8
	Antares	W.	52 57 15	54 29 43	56 2 1	57 34 10
	α Pegasi	E.	53 33 7	52 5 55	50 39 5	49 12 38
	α Arietis	E.	95 0 38	93 28 29	91 56 29	90 24 39

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
1	Spica	W.	104° 52′ 59″	106° 24′ 40″	107° 56′ 12″	109° 27′ 35″
	Antares	W.	59 6 9	60 37 59	62 9 40	63 41 12
	Mars	W.	16 55 41	18 24 36	19 54 2	21 23 51
	α Pegasi	E.	47 46 35	46 20 58	44 55 48	43 31 8
	α Arietis	E.	88 52 58	87 21 26	85 50 4	84 18 50
2	Antares	W.	71 16 47	72 47 29	74 18 4	75 48 30
	Mars	W.	28 55 35	30 26 9	31 56 43	33 27 16
	α Arietis	E.	76 44 51	75 14 28	73 44 14	72 14 7
	Aldebaran	E.	108 59 43	107 30 28	106 1 20	104 32 16
3	Antares	W.	83 18 55	84 48 40	86 18 19	87 47 51
	Mars	W.	40 59 26	42 29 43	43 59 56	45 30 5
	α Aquilæ	W.	39 50 32	40 49 3	41 49 2	42 50 22
	α Arietis	E.	64 45 28	63 16 6	61 46 50	60 17 41
	Aldebaran	E.	97 8 38	95 40 12	94 11 51	92 43 37
4	Antares	W.	95 14 12	96 43 14	98 12 13	99 41 8
	Mars	W.	52 59 53	54 29 40	55 59 23	57 29 4
	α Aquilæ	W.	48 13 53	49 21 23	50 29 40	51 38 41
	α Arietis	E.	52 53 28	51 24 54	49 56 26	48 28 3
	Aldebaran	E.	85 23 42	83 55 58	82 28 18	81 0 41
5	Mars	W.	64 56 50	66 26 18	67 55 45	69 25 11
	α Aquilæ	W.	57 32 51	58 45 14	59 58 4	61 11 19
	α Arietis	E.	41 7 14	39 39 17	38 11 23	36 43 34
	Aldebaran	E.	73 43 34	72 16 18	70 49 5	69 21 53
	Venus	E.	114 13 6	112 44 16	111 15 28	109 46 42
	Sun	E.	138 22 30	137 1 1	135 39 33	134 18 5
6	Mars	W.	76 52 23	78 21 52	79 51 23	81 20 57
	α Aquilæ	W.	67 22 57	68 38 14	69 53 48	71 9 38
	Fomalhaut	W.	42 39 39	43 51 30	45 4 14	46 17 45
	Aldebaran	E.	62 6 22	60 39 19	59 12 17	57 45 16
	Venus	E.	102 23 5	100 54 22	99 25 39	97 56 55
	Pollux	E.	104 3 55	102 35 40	101 7 22	99 39 2
	Sun	E.	127 30 44	126 9 12	124 47 38	123 26 1
7	Mars	W.	88 49 37	90 19 34	91 49 37	93 19 46
	α Aquilæ	W.	77 32 26	78 49 40	80 7 6	81 24 44
	Fomalhaut	W.	52 35 11	53 52 25	55 10 8	56 28 20
	α Pegasi	W.	29 47 18	31 3 21	32 20 30	33 38 38
	Aldebaran	E.	50 30 11	49 3 9	47 36 7	46 9 6
	Venus	E.	90 32 39	89 3 39	87 34 35	86 5 27
	Pollux	E.	92 16 19	90 47 31	89 18 36	87 49 35
	Sun	E.	116 36 57	115 14 53	113 52 43	112 30 26
8	Mars	W.	100 52 23	102 23 20	103 54 27	105 25 43
	α Aquilæ	W.	87 55 42	89 14 25	90 33 18	91 52 20
	Fomalhaut	W.	63 6 4	64 26 51	65 48 1	67 9 32
	α Pegasi	W.	40 21 39	41 44 19	43 7 33	44 31 20
	Aldebaran	E.	38 54 10	37 27 16	36 0 26	34 33 43
	Venus	E.	78 38 17	77 8 31	75 38 37	74 8 35
	Pollux	E.	80 22 29	78 52 37	77 22 34	75 52 20
	Sun	E.	105 37 2	104 13 53	102 50 34	101 27 3

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Spica	W.	110 58 50	112 29 55	114 0 52	115 31 40
	Antares	W.	65 12 36	66 43 51	68 14 58	69 45 57
	Mars	W.	22 53 55	24 24 10	25 54 34	27 25 3
	α Pegasi	E.	42 6 58	40 43 21	39 20 20	37 57 58
	α Arietis	E.	82 47 45	81 16 49	79 46 1	78 15 22
2	Antares	W.	77 18 49	78 49 1	80 19 6	81 49 4
	Mars	W.	34 57 48	36 28 17	37 58 43	39 29 6
	α Arietis	E.	70 44 8	69 14 17	67 44 33	66 14 57
	Aldebaran	E.	103 3 21	101 34 31	100 5 48	98 37 9
3	Antares	W.	89 17 17	90 46 38	92 15 54	93 45 5
	Mars	W.	47 0 10	48 30 11	50 0 8	51 30 2
	α Aquilæ	W.	43 52 57	44 56 40	46 1 27	47 7 13
	α Arietis	E.	58 48 38	57 19 42	55 50 51	54 22 7
	Aldebaran	E.	91 15 28	89 47 24	88 19 25	86 51 31
4	Antares	W.	101 9 59	102 38 47	104 7 33	105 36 17
	Mars	W.	58 58 42	60 28 17	61 57 50	63 27 21
	α Aquilæ	W.	52 48 21	53 58 39	55 9 31	56 20 56
	α Arietis	E.	46 59 44	45 31 30	44 3 20	42 35 15
	Aldebaran	E.	79 33 9	78 5 41	76 38 16	75 10 53
5	Mars	W.	70 54 36	72 24 2	73 53 28	75 22 55
	α Aquilæ	W.	62 24 57	63 38 57	64 53 18	66 7 58
	α Arietis	E.	35 15 48	33 48 6	32 20 28	30 52 55
	Aldebaran	E.	67 54 44	66 27 37	65 0 31	63 33 26
	Venus	E.	108 17 57	106 49 13	105 20 30	103 51 48
	Sun	E.	132 56 38	131 35 11	130 13 43	128 52 14
6	Mars	W.	82 50 34	84 20 14	85 49 57	87 19 44
	α Aquilæ	W.	72 25 43	73 42 3	74 58 37	76 15 25
	Fomalhaut	W.	47 31 58	48 46 51	50 2 23	51 18 30
	Aldebaran	E.	56 18 15	54 51 14	53 24 13	51 57 12
	Venus	E.	96 28 8	94 59 20	93 30 29	92 1 36
	Pollux	E.	98 10 38	96 42 10	95 13 38	93 45 1
	Sun	E.	122 4 20	120 42 36	119 20 48	117 58 55
7	Mars	W.	94 50 2	96 20 26	97 50 57	99 21 36
	α Aquilæ	W.	82 42 34	84 0 35	85 18 47	86 37 9
	Fomalhaut	W.	57 47 1	59 6 9	60 25 42	61 45 41
	α Pegasi	W.	34 57 42	36 17 34	37 38 13	38 59 36
	Aldebaran	E.	44 42 5	43 15 4	41 48 4	40 21 6
	Venus	E.	84 36 13	83 6 53	81 37 28	80 7 56
	Pollux	E.	86 20 26	84 51 10	83 21 45	81 52 12
	Sun	E.	111 8 2	109 45 30	108 22 50	107 0 1
8	Mars	W.	106 57 11	108 28 51	110 0 42	111 32 45
	α Aquilæ	W.	93 11 31	94 30 51	95 50 20	97 9 57
	Fomalhaut	W.	68 31 27	69 53 44	71 16 22	72 39 20
	α Pegasi	W.	45 55 40	47 20 30	48 45 50	50 11 38
	Aldebaran	E.	33 7 7	31 40 40	30 14 25	28 48 26
	Venus	E.	72 38 23	71 8 2	69 37 32	68 6 51
	Pollux	E.	74 21 55	72 51 18	71 20 28	69 49 26
	Sun	E.	100 3 22	98 39 27	97 15 19	95 50 58

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
9	*a* Aquilæ	W.	98 29 42	99 49 34	101 9 33	102 29 39
	Fomalhaut	W.	74 2 40	75 26 21	76 50 22	78 14 43
	a Pegasi	W.	51 37 54	53 4 38	54 31 47	55 59 23
	Venus	E.	66 36 0	65 4 58	63 33 44	62 2 18
	Pollux	E.	68 18 10	66 46 40	65 14 56	63 42 57
	Sun	E.	94 26 23	93 1 33	91 36 28	90 11 7
10	Fomalhaut	W.	85 21 30	86 47 51	88 14 31	89 41 30
	a Pegasi	W.	63 23 47	64 53 56	66 24 29	67 55 27
	a Arietis	W.	19 48 32	21 20 16	22 52 38	24 25 36
	Venus	E.	54 21 54	52 49 8	51 16 9	49 42 56
	Pollux	E.	55 59 1	54 25 23	52 51 27	51 17 13
	Sun	E.	83 0 7	81 33 0	80 5 33	78 37 47
11	Fomalhaut	W.	97 1 7	98 29 58	99 59 5	101 28 28
	a Pegasi	W.	75 36 37	77 10 6	78 44 1	80 18 21
	a Arietis	W.	32 18 30	33 54 34	35 31 7	37 8 7
	Venus	E.	41 53 12	40 18 34	38 43 44	37 8 41
	Pollux	E.	43 21 21	41 45 13	40 8 47	38 32 2
	Sun	E.	71 13 36	69 43 39	68 13 19	66 42 35
12	*a* Pegasi	W.	88 16 20	89 53 11	91 30 27	93 8 8
	a Arietis	W.	45 20 9	46 59 57	48 40 12	50 20 55
	Venus	E.	29 11 15	27 35 35	26 0 0	24 24 34
	Sun	E.	59 2 50	57 29 38	55 56 0	54 21 57
13	*a* Arietis	W.	58 51 25	60 34 53	62 18 48	64 3 10
	Aldebaran	W.	27 47 19	29 24 34	31 2 52	32 42 9
	Sun	E.	46 25 11	44 48 32	43 11 27	41 33 57
14	*a* Arietis	W.	72 51 33	74 38 30	76 25 51	78 13 35
	Aldebaran	W.	41 10 56	42 54 48	44 39 17	46 24 21
	Sun	E.	33 20 12	31 40 15	29 59 55	28 19 14
18	Sun	W.	22 27 46	24 13 19	25 58 49	27 44 13
	Spica	E.	34 2 17	32 9 41	30 17 15	28 25 1
	Antares	E.	79 42 56	77 49 45	75 56 42	74 3 47
19	Sun	W.	36 29 8	38 13 33	39 57 45	41 41 43
	Antares	E.	64 41 40	62 49 52	60 58 18	59 6 58
	Mars	E.	105 47 6	103 55 48	102 4 45	100 13 58
20	Sun	W.	50 17 27	51 59 42	53 41 38	55 23 15
	Antares	E.	49 54 32	48 4 57	46 15 42	44 26 47
	Mars	E.	91 4 20	89 15 21	87 26 42	85 38 23
	a Aquilæ	E.	103 1 2	101 26 15	99 51 33	98 17 0
21	Sun	W.	63 46 6	65 25 36	67 4 45	68 43 31
	Antares	E.	35 27 22	33 40 34	31 54 8	30 8 3
	Mars	E.	76 42 13	74 56 6	73 10 22	71 25 1
	a Aquilæ	E.	90 27 23	88 54 17	87 21 31	85 49 7
22	Sun	W.	76 51 51	78 28 24	80 4 35	81 40 24
	Spica	W.	24 36 4	26 19 6	28 1 51	29 44 19
	Mars	E.	62 44 6	61 1 6	59 18 29	57 36 16

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
9	α Aquilæ	W.	103 49 50	105 10 7	106 30 28	107 50 52
	Fomalhaut	W.	79 39 24	81 4 26	82 29 48	83 55 29
	α Pegasi	W.	57 27 25	58 55 53	60 24 46	61 54 3
	Venus	E.	60 30 39	58 58 48	57 26 44	55 54 26
	Pollux	E.	62 10 42	60 38 12	59 5 25	57 32 22
	Sun	E.	88 45 30	87 19 36	85 53 24	84 26 55
10	Fomalhaut	W.	91 8 48	92 36 26	94 4 22	95 32 35
	α Pegasi	W.	69 26 51	70 58 40	72 30 54	74 3 33
	α Arietis	W.	25 59 8	27 33 13	29 7 49	30 42 55
	Venus	E.	48 9 28	46 35 45	45 1 48	43 27 37
	Pollux	E.	49 42 40	48 7 49	46 32 38	44 57 9
	Sun	E.	77 9 40	75 41 12	74 12 22	72 43 10
11	Fomalhaut	W.	102 58 9	104 28 5	105 58 16	107 28 40
	α Pegasi	W.	81 53 6	83 28 17	85 3 53	86 39 54
	α Arietis	W.	38 45 36	40 23 33	42 1 57	43 40 49
	Venus	E.	35 33 27	33 58 3	32 22 32	30 46 56
	Pollux	E.	36 54 58	35 17 36	33 39 57	32 2 2
	Sun	E.	65 11 27	63 39 55	62 7 58	60 35 37
12	α Pegasi	W.	94 46 14	96 24 44	98 3 38	99 42 55
	α Arietis	W.	52 2 6	53 43 44	55 25 50	57 8 24
	Venus	E.	22 49 26	21 14 46	19 40 45	18 7 40
	Sun	E.	52 47 28	51 12 32	49 37 11	48 1 24
13	α Arietis	W.	65 47 59	67 33 14	69 18 55	71 5 1
	Aldebaran	W.	34 22 21	36 3 22	37 45 11	39 27 43
	Sun	E.	39 56 1	38 17 41	36 38 55	34 59 46
14	α Arietis	W.	80 1 43	81 50 14	83 39 7	85 28 21
	Aldebaran	W.	48 9 56	49 56 5	51 42 43	53 29 49
	Sun	E.	26 38 11	24 56 48	23 15 5	21 33 5
18	Sun	W.	29 29 31	31 14 40	32 59 40	34 44 30
	Spica	E.	26 33 1	24 41 18	22 49 53	20 58 49
	Antares	E.	72 11 0	70 18 23	68 25 57	66 33 42
19	Sun	W.	43 25 26	45 8 52	46 52 1	48 34 53
	Antares	E.	57 15 54	55 25 8	53 34 38	51 44 25
	Mars	E.	98 23 27	96 33 13	94 43 19	92 53 39
20	Sun	W.	57 4 31	58 45 26	60 26 1	62 6 15
	Antares	E.	42 38 12	40 49 58	39 2 5	37 14 33
	Mars	E.	83 50 25	82 2 49	80 15 35	78 28 43
	α Aquilæ	E.	96 42 37	95 8 26	93 34 29	92 0 47
21	Sun	W.	70 21 56	71 59 58	73 37 38	75 14 56
	Antares	E.	28 22 21	26 37 1	24 52 4	23 7 28
	Mars	E.	69 40 3	67 55 29	66 11 18	64 27 30
	α Aquilæ	E.	84 17 5	82 45 27	81 14 15	79 43 29
22	Sun	W.	83 15 51	84 50 56	86 25 40	88 0 2
	Spica	W.	31 26 30	33 8 21	34 49 54	36 31 10
	Mars	E.	55 54 26	54 12 59	52 31 56	50 51 16

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
22	α Aquilæ	E.	78° 13′ 11″	76° 43′ 22″	75° 14′ 4″	73° 45′ 17″
23	Sun	W.	89 34 3	91 7 43	92 41 2	94 14 1
	Spica	W.	38 12 5	39 52 40	41 32 57	43 12 56
	Mars	E.	49 10 59	47 31 5	45 51 35	44 12 27
	α Aquilæ	E.	66 30 2	65 4 53	63 40 24	62 16 40
	Fomalhaut	E.	90 2 20	88 29 51	86 57 43	85 25 54
24	Sun	W.	101 53 56	103 24 57	104 55 40	106 26 5
	Spica	W.	51 28 6	53 6 14	54 44 4	56 21 35
	Mars	E.	36 2 30	34 25 39	32 49 11	31 13 8
	α Aquilæ	E.	55 29 51	54 11 9	52 53 25	51 36 43
	Fomalhaut	E.	77 52 10	76 22 33	74 53 19	73 24 29
	α Pegasi	E.	98 58 26	97 23 41	95 49 11	94 14 58
25	Sun	W.	113 53 50	115 22 34	116 51 1	118 19 13
	Spica	W.	64 25 7	66 1 1	67 36 40	69 12 5
	Antares	W.	18 34 47	20 10 50	21 46 39	23 22 12
	Fomalhaut	E.	66 6 43	64 40 31	63 14 48	61 49 35
	α Pegasi	E.	86 27 53	84 55 17	83 22 56	81 50 51
26	Sun	W.	125 36 32	127 3 18	128 29 51	129 56 11
	Spica	W.	77 5 34	78 39 35	80 13 24	81 47 1
	Antares	W.	31 16 25	32 50 34	34 24 31	35 58 16
	Fomalhaut	E.	54 51 34	53 29 45	52 8 35	50 48 8
	α Pegasi	E.	74 14 24	72 43 55	71 13 41	69 43 44
27	Spica	W.	89 32 9	91 4 37	92 36 56	94 9 5
	Antares	W.	43 44 5	45 16 41	46 49 7	48 21 24
	Fomalhaut	E.	44 17 39	43 2 18	41 48 0	40 34 50
	α Pegasi	E.	62 18 4	60 49 47	59 21 47	57 54 5
	α Arietis	E.	104 12 3	102 39 47	101 7 41	99 35 44
28	Spica	W.	101 47 27	103 18 41	104 49 47	106 20 45
	Antares	W.	56 0 26	57 31 48	59 3 2	60 34 8
	α Pegasi	E.	50 40 23	49 14 41	47 49 22	46 24 28
	α Arietis	E.	91 58 17	90 27 13	88 56 17	87 25 28
29	Antares	W.	68 7 49	69 38 13	71 8 30	73 38 41
	Mars	W.	26 27 11	27 55 12	29 23 13	30 51 13
	α Pegasi	E.	39 26 59	38 5 8	36 43 57	35 23 29
	α Arietis	E.	79 53 21	78 23 18	76 53 21	75 23 31
	Aldebaran	E.	112 5 55	110 37 0	109 8 10	107 39 24
30	Antares	W.	80 8 12	81 37 50	83 7 24	84 36 53
	Mars	W.	38 10 43	39 38 29	41 6 12	42 33 52
	α Aquilæ	W.	37 51 37	38 46 49	39 43 40	40 42 3
	α Arietis	E.	67 55 48	66 26 31	64 57 20	63 28 14
	Aldebaran	E.	100 16 40	98 48 19	97 20 3	95 51 51
31	Antares	W.	92 3 18	93 32 24	95 1 27	96 30 27
	Mars	W.	49 51 24	51 18 46	52 46 5	54 13 21
	α Aquilæ	W.	45 53 39	46 59 17	48 5 51	49 13 17
	α Arietis	E.	56 3 55	54 35 17	53 6 43	51 38 13
	Aldebaran	E.	88 31 46	87 3 55	85 36 8	84 8 24

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
22	α Aquilæ	E.	72° 17′ 3″	70° 49′ 23″	69° 22′ 19″	67° 55′ 51″
23	Sun	W.	95 46 40	97 18 58	98 50 57	100 22 36
	Spica	W.	44 52 35	46 31 55	48 10 57	49 49 40
	Mars	E.	42 33 42	40 55 19	39 17 20	37 39 43
	α Aquilæ	E.	60 53 40	59 31 27	58 10 3	56 49 30
	Fomalhaut	E.	83 54 26	82 23 19	80 52 33	79 22 10
24	Sun	W.	107 56 12	109 26 2	110 55 35	112 24 51
	Spica	W.	57 58 51	59 35 49	61 12 31	62 48 57
	Mars	E.	29 37 28	28 2 13	26 27 23	24 52 59
	α Aquilæ	E.	50 21 6	49 6 39	47 53 23	46 41 26
	Fomalhaut	E.	71 56 4	70 28 4	69 0 30	67 33 23
	α Pegasi	E.	92 41 1	91 7 20	89 33 55	88 0 46
25	Sun	W.	119 47 10	121 14 52	122 42 20	124 9 33
	Spica	W.	70 47 15	72 22 10	73 56 51	75 31 20
	Antares	W.	24 57 31	26 32 36	28 7 26	29 42 2
	Fomalhaut	E.	60 24 53	59 0 42	57 37 4	56 14 1
	α Pegasi	E.	80 19 1	78 47 28	77 16 11	75 45 9
26	Sun	W.	131 22 18	132 48 13	134 13 55	135 39 25
	Spica	W.	83 20 25	84 53 38	86 26 39	87 59 30
	Antares	W.	37 31 49	39 5 10	40 38 19	42 11 17
	Fomalhaut	E.	49 28 23	48 9 25	46 51 16	45 34 0
	α Pegasi	E.	68 14 3	66 44 38	65 15 30	63 46 38
27	Spica	W.	95 41 4	97 12 53	98 44 33	100 16 4
	Antares	W.	49 53 31	51 25 28	52 57 16	54 28 56
	Fomalhaut	E.	39 22 54	38 12 17	37 3 6	35 55 28
	α Pegasi	E.	56 26 41	54 59 37	53 32 52	52 6 27
	α Arietis	E.	98 3 56	96 32 18	95 0 49	93 29 29
28	Spica	W.	107 51 35	109 22 18	110 52 53	112 23 21
	Antares	W.	62 5 7	63 35 58	65 6 42	66 37 19
	α Pegasi	E.	45 0 0	43 35 59	42 12 27	40 49 26
	α Arietis	E.	85 54 47	84 24 14	82 53 49	81 23 31
29	Antares	W.	74 8 46	75 38 45	77 8 39	78 38 27
	Mars	W.	32 19 11	33 47 8	35 15 2	36 42 54
	α Pegasi	E.	34 3 48	32 44 59	31 27 9	30 10 24
	α Arietis	E.	73 53 47	72 24 9	70 54 37	69 25 10
	Aldebaran	E.	106 10 43	104 42 6	103 13 33	101 45 4
30	Antares	W.	86 6 18	87 35 39	89 4 56	90 34 9
	Mars	W.	44 1 29	45 29 2	46 56 33	48 24 1
	α Aquilæ	W.	41 41 52	42 43 2	43 45 26	44 49 0
	α Arietis	E.	61 59 13	60 30 16	59 1 25	57 32 38
	Aldebaran	E.	94 23 43	92 55 38	91 27 37	89 59 40
31	Antares	W.	97 59 24	99 28 19	100 57 11	102 26 0
	Mars	W.	55 40 34	57 7 46	58 34 54	60 2 0
	α Aquilæ	W.	50 21 29	51 30 27	52 40 7	53 50 24
	α Arietis	E.	50 9 47	48 41 25	47 13 7	45 44 52
	Aldebaran	E.	82 40 44	81 13 6	79 45 31	78 17 58

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Antares	W.	103 54 49	105 23 36	106 52 21	108 21 5
	Mars	W.	61 29 4	62 56 7	64 23 9	65 50 8
	α Aquilæ	W.	55 1 17	56 12 44	57 24 40	58 37 6
	α Arietis	E.	44 16 41	42 48 34	41 20 31	39 52 31
	Aldebaran	E.	76 50 29	75 23 2	73 55 37	72 28 15
	Venus	E.	125 16 42	123 53 18	122 29 55	121 6 33
2	Mars	W.	73 4 52	74 31 47	75 58 43	77 25 40
	α Aquilæ	W.	64 45 25	66 0 8	67 15 9	68 30 27
	Fomalhaut	W.	40 6 6	41 15 58	42 26 49	43 38 34
	α Arietis	E.	32 33 33	31 5 59	29 38 30	28 11 8
	Aldebaran	E.	65 11 59	63 44 49	62 17 41	60 50 35
	Pollux	E.	107 13 11	105 44 58	104 16 44	102 48 29
	Venus	E.	114 9 51	112 46 31	111 23 11	109 59 50
3	Mars	W.	84 40 37	86 7 41	87 34 48	89 1 58
	α Aquilæ	W.	74 50 43	76 7 25	77 24 18	78 41 22
	Fomalhaut	W.	49 48 31	51 4 25	52 20 51	53 37 47
	α Pegasi	W.	27 12 2	28 25 5	29 39 30	30 55 9
	Aldebaran	E.	53 35 29	52 8 32	50 41 38	49 14 46
	Pollux	E.	95 26 49	93 58 22	92 29 51	91 1 16
	Venus	E.	103 2 47	101 39 17	100 15 44	98 52 9
	Jupiter	E.	118 54 30	117 27 12	115 59 50	114 32 26
4	Mars	W.	96 18 41	97 46 14	99 13 53	100 41 38
	α Aquilæ	W.	85 9 4	86 27 2	87 45 7	89 3 19
	Fomalhaut	W.	60 9 7	61 28 34	62 48 22	64 8 30
	α Pegasi	W.	37 27 36	38 48 22	40 9 45	41 31 40
	Aldebaran	E.	42 1 3	40 34 29	39 7 59	37 41 36
	Pollux	E.	83 37 25	82 8 24	80 39 17	79 10 5
	Venus	E.	91 53 17	90 29 17	89 5 12	87 41 1
	Jupiter	E.	107 14 16	105 46 23	104 18 24	102 50 18
5	Mars	W.	108 2 1	109 30 28	110 59 4	112 27 50
	α Aquilæ	W.	95 35 48	96 54 33	98 13 22	99 32 15
	Fomalhaut	W.	70 53 53	72 15 51	73 38 5	75 0 35
	α Pegasi	W.	48 28 46	49 53 29	51 18 36	52 44 5
	Pollux	E.	71 42 14	70 12 16	68 42 9	67 11 53
	Venus	E.	80 38 25	79 13 31	77 48 28	76 23 16
	Jupiter	E.	95 27 57	93 59 3	92 30 0	91 0 47
	Sun	E.	123 46 40	122 23 40	121 0 30	119 37 10
6	Fomalhaut	W.	81 57 8	83 21 13	84 45 34	86 10 8
	α Pegasi	W.	59 56 53	61 24 30	62 52 26	64 20 42
	α Arietis	W.	16 19 12	17 47 22	19 16 15	20 45 49
	Pollux	E.	59 38 2	58 6 41	56 35 10	55 3 25
	Venus	E.	69 14 40	67 48 23	66 21 53	64 55 10
	Jupiter	E.	83 31 55	82 1 32	80 30 56	79 9 5
	Sun	E.	112 37 41	111 13 10	109 48 26	108 23 28
7	Fomalhaut	W.	93 16 41	94 42 43	96 8 59	97 35 28
	α Pegasi	W.	71 47 3	73 17 21	74 47 58	76 18 55
	α Arietis	W.	28 21 50	29 54 26	31 27 25	33 0 51
	Pollux	E.	47 21 27	45 48 21	44 15 1	42 41 26
	Venus	E.	57 38 3	56 9 51	54 41 23	53 12 38

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Antares	W.	109 49 48	111 18 30	112 47 12	114 15 53
	Mars	W.	67 17 6	68 44 3	70 11 0	71 37 56
	α Aquilæ	W.	59 49 58	61 3 16	62 16 57	63 31 1
	α Arietis	E.	38 24 35	36 56 43	35 28 56	34 1 13
	Aldebaran	E.	71 0 56	69 33 39	68 6 23	66 39 10
	Venus	E.	119 43 12	118 19 51	116 56 31	115 33 11
2	Mars	W.	78 52 37	80 19 35	81 46 34	83 13 35
	α Aquilæ	W.	69 46 2	71 1 51	72 17 55	73 34 13
	Fomalhaut	W.	44 51 8	46 4 28	47 18 31	48 33 12
	α Arietis	E.	26 43 54	25 16 46	23 49 49	22 23 4
	Aldebaran	E.	59 23 31	57 56 28	56 29 27	55 2 27
	Pollux	E.	101 20 13	99 51 55	98 23 35	96 55 13
	Venus	E.	108 36 28	107 13 5	105 49 41	104 26 15
3	Mars	W.	90 29 11	91 56 27	93 23 47	94 51 12
	α Aquilæ	W.	79 58 36	81 16 0	82 33 32	83 51 14
	Fomalhaut	W.	54 55 12	56 13 4	57 31 21	58 50 2
	α Pegasi	W.	32 11 52	33 29 34	34 48 8	36 7 31
	Aldebaran	E.	47 47 56	46 21 8	44 54 23	43 27 41
	Pollux	E.	89 32 39	88 3 57	86 35 11	85 6 21
	Venus	E.	97 28 30	96 4 48	94 41 2	93 17 12
	Jupiter	E.	113 4 57	111 37 24	110 9 47	108 42 4
4	Mars	W.	102 9 29	103 37 26	105 5 31	106 33 42
	α Aquilæ	W.	90 21 37	91 40 1	92 58 31	94 17 7
	Fomalhaut	W.	65 28 58	66 49 44	68 10 49	69 32 12
	α Pegasi	W.	42 54 9	44 17 7	45 40 34	47 4 27
	Aldebaran	E.	36 15 19	34 49 10	33 23 12	31 57 26
	Pollux	E.	77 40 45	76 11 19	74 41 45	73 12 4
	Venus	E.	86 16 43	84 52 19	83 27 49	82 3 11
	Jupiter	E.	101 22 5	99 53 45	98 25 17	96 56 41
5	Mars	W.	113 56 44	115 25 49	116 55 4	118 24 30
	α Aquilæ	W.	100 51 11	102 10 10	103 29 10	104 48 13
	Fomalhaut	W.	76 23 22	77 46 25	79 9 44	80 33 18
	α Pegasi	W.	54 9 56	55 36 10	57 2 43	58 29 38
	Pollux	E.	65 41 28	64 10 52	62 40 6	61 9 9
	Venus	E.	74 57 54	73 32 21	72 6 38	70 40 45
	Jupiter	E.	89 31 23	88 1 48	86 32 3	85 2 5
	Sun	E.	118 13 39	116 49 57	115 26 4	114 1 59
6	Fomalhaut	W.	87 34 57	89 0 2	90 25 22	91 50 54
	α Pegasi	W.	65 49 17	67 18 13	68 47 30	70 17 7
	α Arietis	W.	22 15 59	23 46 41	25 17 55	26 49 39
	Pollux	E.	53 31 27	51 59 18	50 26 55	48 54 17
	Venus	E.	63 28 14	62 1 3	60 33 38	59 5 58
	Jupiter	E.	77 29 0	75 57 40	74 26 5	72 54 13
	Sun	E.	106 58 15	105 32 47	104 7 4	102 41 4
7	Fomalhaut	W.	99 2 11	100 29 7	101 56 17	103 23 38
	α Pegasi	W.	77 50 14	79 21 54	80 53 55	82 26 17
	α Arietis	W.	34 34 39	36 8 52	37 43 28	39 18 28
	Pollux	E.	41 7 38	39 33 35	37 59 16	36 24 43
	Venus	E.	51 43 36	50 14 16	48 44 38	47 14 41

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
7	Jupiter	E.	71 22 5	69 49 40	68 16 58	66 43 57
	Sun	E.	101 14 48	99 48 16	98 21 27	96 54 19
8	Fomalhaut	W.	104 51 12	106 18 58	107 46 55	109 15 12
	α Pegasi	W.	83 59 0	85 32 4	87 5 30	88 39 18
	α Arietis	W.	40 53 52	42 29 40	44 5 53	45 42 28
	Pollux	E.	34 49 57	33 14 57	31 39 44	30 4 21
	Venus	E.	45 44 25	44 13 49	42 42 53	41 11 38
	Jupiter	E.	58 54 8	57 19 9	55 43 49	54 8 7
	Sun	E.	89 33 51	88 4 45	86 35 18	85 5 29
9	α Arietis	W.	53 51 41	55 30 48	57 10 20	58 50 18
	Aldebaran	W.	23 6 26	24 37 13	26 9 24	27 42 50
	Venus	E.	33 30 6	31 56 43	30 22 59	28 48 54
	Jupiter	E.	46 3 56	44 25 55	42 47 30	41 8 40
	Sun	E.	77 30 44	75 58 36	74 26 4	72 53 8
10	α Arietis	W.	67 16 46	68 59 25	70 42 29	72 26 2
	Aldebaran	W.	35 44 55	37 23 52	39 3 32	40 43 55
	Jupiter	E.	32 48 16	31 6 55	29 25 9	27 42 59
	Sun	E.	65 2 6	63 26 37	61 50 42	60 14 22
11	α Arietis	W.	81 10 24	82 56 35	84 43 14	86 30 18
	Aldebaran	W.	49 15 19	50 59 22	52 43 58	54 29 6
	Sun	E.	52 6 13	50 27 20	48 48 1	47 8 19
12	α Arietis	W.	95 31 51	97 21 21	99 11 13	101 1 28
	Aldebaran	W.	63 22 11	65 10 12	66 58 38	68 47 29
	Pollux	W.	21 14 36	23 0 31	24 47 20	26 34 56
	Sun	E.	38 44 2	37 2 7	35 19 52	33 37 19
17	Sun	W.	32 15 51	33 59 8	35 42 11	37 24 56
	Antares	E.	40 58 58	39 7 29	37 16 18	35 25 28
	Mars	E.	87 56 53	86 8 19	84 20 6	82 32 14
	α Aquilæ	E.	95 12 35	93 35 23	91 58 25	90 21 43
18	Sun	W.	45 53 50	47 34 31	49 14 50	50 54 46
	Mars	E.	73 38 37	71 53 6	70 8 1	68 23 21
	α Aquilæ	E.	82 23 30	80 49 7	79 15 14	77 41 52
	Fomalhaut	E.	107 3 43	105 25 10	103 46 50	102 8 45
19	Sun	W.	59 8 14	60 45 39	62 22 39	63 59 13
	Mars	E.	59 46 39	58 4 40	56 23 7	54 42 3
	α Aquilæ	E.	70 3 47	68 34 7	67 5 10	65 36 58
	Fomalhaut	E.	94 2 38	92 26 26	90 50 37	89 15 11
	α Pegasi	E.	115 49 48	114 9 18	112 29 6	110 49 13
20	Sun	W.	71 55 41	73 29 42	75 3 18	76 36 29
	Mars	E.	46 23 29	44 45 9	43 7 14	41 29 47
	α Aquilæ	E.	58 28 18	57 5 17	55 43 16	54 22 17
	Fomalhaut	E.	81 24 20	79 51 31	78 19 11	76 47 19
	α Pegasi	E.	102 34 42	100 56 51	99 19 22	97 42 15
21	Sun	W.	84 16 26	85 47 15	87 17 41	88 47 46
	Antares	W.	15 10 46	16 49 9	18 27 11	20 4 50

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
7	Jupiter	E.	65 10 38	63 37 0	62 3 3	60 28 45
	Sun	E.	95 26 52	93 59 6	92 31 1	91 2 36
8	Fomalhaut	W.	110 43 59	112 11 45	113 40 19	115 9 0
	α Pegasi	W.	90 13 28	91 48 0	93 22 53	94 58 9
	α Arietis	W.	47 19 29	48 56 55	50 34 46	52 13 0
	Pollux	E.	28 28 46	26 53 2	25 17 13	23 41 22
	Venus	E.	39 40 2	38 8 5	36 35 46	35 3 7
	Jupiter	E.	52 32 3	50 55 36	49 18 46	47 41 32
	Sun	E.	83 35 18	82 4 44	80 33 48	79 2 28
9	α Arietis	W.	60 30 43	62 11 34	63 52 51	65 34 35
	Aldebaran	W.	29 17 22	30 52 55	32 29 24	34 6 45
	Venus	E.	27 14 28	25 39 41	24 4 34	22 29 8
	Jupiter	E.	39 29 25	37 49 46	36 9 41	34 29 11
	Sun	E.	71 19 47	69 46 0	68 11 47	66 37 9
10	α Arietis	W.	74 10 0	75 54 25	77 39 18	79 24 37
	Aldebaran	W.	42 24 57	44 6 38	45 48 56	47 31 50
	Jupiter	E.	26 0 23	24 17 22	22 33 59	20 50 12
	Sun	E.	58 37 36	57 0 23	55 22 45	53 44 41
11	α Arietis	W.	88 17 48	90 5 42	91 54 1	93 42 44
	Aldebaran	W.	56 14 45	58 0 53	59 47 31	61 34 37
	Sun	E.	45 28 13	43 47 43	42 6 51	40 25 37
12	α Arietis	W.	102 52 3	104 42 58	106 34 13	108 25 46
	Aldebaran	W.	70 36 43	72 26 20	74 16 19	76 6 38
	Pollux	W.	28 23 14	30 12 11	32 1 42	33 51 44
	Sun	E.	31 54 30	30 11 25	28 28 8	26 44 40
17	Sun	W.	39 7 23	40 49 31	42 31 19	44 12 46
	Antares	E.	33 35 1	31 44 55	29 55 12	28 5 53
	Mars	E.	80 44 44	78 57 37	77 10 52	75 24 33
	α Aquilæ	E.	88 45 20	87 9 18	85 33 37	83 58 21
18	Sun	W.	52 34 17	54 13 24	55 52 6	57 30 23
	Mars	E.	66 39 7	64 55 19	63 11 58	61 29 4
	α Aquilæ	E.	76 9 2	74 36 47	73 5 8	71 34 8
	Fomalhaut	E.	100 30 54	98 53 21	97 16 7	95 39 13
19	Sun	W.	65 35 22	67 11 5	68 46 22	70 21 15
	Mars	E.	53 1 25	51 21 16	49 41 33	48 2 17
	α Aquilæ	E.	64 9 33	62 42 55	61 17 8	59 52 15
	Fomalhaut	E.	87 40 8	86 5 32	84 31 22	82 57 38
	α Pegasi	E.	109 9 39	107 30 23	105 51 29	104 12 55
20	Sun	W.	78 9 17	79 41 40	81 13 38	82 45 14
	Mars	E.	39 52 48	38 16 13	36 40 6	35 4 25
	α Aquilæ	E.	53 2 23	51 43 38	50 26 5	49 9 48
	Fomalhaut	E.	75 15 56	73 45 4	72 14 42	70 44 52
	α Pegasi	E.	96 5 29	94 29 6	92 53 5	91 17 26
21	Sun	W.	90 17 29	91 46 50	93 15 51	94 44 31
	Antares	W.	21 42 9	23 19 6	24 55 43	26 32 0

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
21	Mars	E.	33 29 12	31 54 25	30 20 4	28 46 10
	Fomalhaut	E.	69 15 34	67 46 49	66 18 37	64 50 59
	a Pegasi	E.	89 42 9	88 7 15	86 32 43	84 58 33
22	Sun	W.	96 12 51	97 40 51	99 8 33	100 35 56
	Antares	W.	28 7 58	29 43 35	31 18 54	32 53 54
	Fomalhaut	E.	57 41 50	56 17 57	54 54 43	53 32 13
	a Pegasi	E.	77 13 8	75 41 7	74 9 28	72 38 11
23	Sun	W.	107 48 27	109 14 8	110 39 32	112 4 43
	Antares	W.	40 44 35	42 17 55	43 51 0	45 23 51
	Fomalhaut	E.	46 51 33	45 34 4	44 17 34	43 2 7
	a Pegasi	E.	65 6 57	63 37 45	62 8 54	60 40 24
	a Arietis	E.	107 10 23	105 37 26	104 4 42	102 32 12
24	Sun	W.	119 7 8	120 30 58	121 54 37	123 18 3
	Antares	W.	53 4 44	54 36 17	56 7 39	57 38 51
	a Pegasi	E.	53 23 17	51 56 59	50 31 5	49 5 35
	a Arietis	E.	94 53 0	93 21 46	91 50 44	90 19 51
25	Antares	W.	65 12 24	66 42 40	68 12 49	69 42 51
	Mars	W.	15 31 44	16 56 28	18 21 23	19 46 27
	a Pegasi	E.	42 4 45	40 42 6	39 20 1	37 58 33
	a Arietis	E.	82 47 58	81 18 2	79 48 14	78 18 33
	Aldebaran	E.	114 59 57	113 31 10	112 2 29	110 33 52
26	Antares	W.	77 11 20	78 40 45	80 10 6	81 39 21
	Mars	W.	26 52 50	28 18 9	29 43 28	31 8 45
	a Arietis	E.	70 51 48	69 22 45	67 53 47	66 24 54
	Aldebaran	E.	103 12 5	101 43 57	100 15 52	98 47 50
27	Antares	W.	89 4 46	90 33 42	92 2 36	93 31 28
	a Aquilæ	W.	43 43 26	44 47 0	45 51 40	46 57 20
	Mars	W.	38 14 57	39 40 8	41 5 17	42 30 26
	a Arietis	E.	59 1 33	57 33 4	56 4 38	54 36 16
	Aldebaran	E.	91 28 33	90 0 49	88 33 8	87 5 27
28	Antares	W.	100 55 26	102 24 12	103 52 57	105 21 42
	a Aquilæ	W.	52 38 28	53 48 52	54 59 53	56 11 28
	Mars	W.	49 35 59	51 1 5	52 26 12	53 51 18
	a Arietis	E.	47 15 1	45 46 53	44 18 47	42 50 44
	Aldebaran	E.	79 47 36	78 20 5	76 52 36	75 25 7
29	*a* Aquilæ	W.	62 16 43	63 31 3	64 45 43	66 0 44
	Mars	W.	60 56 57	62 22 9	63 47 24	65 12 37
	Fomalhaut	W.	37 47 9	38 54 46	40 3 33	41 13 25
	a Arietis	E.	35 31 3	34 3 15	32 35 40	31 7 59
	Aldebaran	E.	68 7 54	66 40 28	65 13 4	63 45 39
	Pollux	E.	110 11 41	108 43 23	107 15 2	105 46 40
30	Mars	W.	72 19 19	73 44 47	75 10 18	76 35 52
	a Aquilæ	W.	72 20 15	73 36 56	74 53 50	76 10 57
	Fomalhaut	W.	47 16 22	48 31 14	49 46 43	51 2 48
	Aldebaran	E.	56 28 43	55 1 21	53 34 0	52 6 40
	Pollux	E.	98 24 12	96 55 34	95 26 52	93 58 7

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
21	Mars	E.	27 12 44	25 39 45	24 7 14	22 35 12
	Fomalhaut	E.	63 23 56	61 57 29	60 31 38	59 6 24
	α Pegasi	E.	83 24 45	81 51 18	80 18 13	78 45 30
22	Sun	W.	102 3 1	103 29 47	104 56 17	106 22 30
	Antares	W.	34 28 36	36 3 1	37 37 9	39 11 0
	Fomalhaut	E.	52 10 27	50 49 28	49 29 18	48 9 58
	α Pegasi	E.	71 7 15	69 36 39	68 6 24	66 36 30
23	Sun	W.	113 29 39	114 54 21	116 18 49	117 43 5
	Antares	W.	46 56 28	48 28 51	50 1 1	51 32 59
	Fomalhaut	E.	41 47 47	40 34 39	39 22 48	38 12 20
	α Pegasi	E.	59 12 15	57 44 28	56 17 2	54 49 58
	α Arietis	E.	100 59 55	99 27 53	97 56 3	96 24 26
24	Sun	W.	124 41 19	126 4 24	127 27 19	128 50 4
	Antares	W.	59 9 53	60 40 45	62 11 27	63 42 0
	α Pegasi	E.	47 40 30	46 15 51	44 51 40	43 27 57
	α Arietis	E.	88 49 10	87 18 38	85 48 16	84 18 2
25	Antares	W.	71 12 45	72 42 32	74 12 13	75 41 49
	Mars	W.	21 11 38	22 36 53	24 2 10	25 27 30
	α Pegasi	E.	36 37 45	35 17 41	33 58 25	32 40 0
	α Arietis	E.	76 48 59	75 19 33	73 50 11	72 20 56
	Aldebaran	E.	109 5 21	107 36 56	106 8 35	104 40 18
26	Antares	W.	83 8 33	84 37 41	86 6 45	87 35 47
	Mars	W.	32 34 2	33 59 18	35 24 32	36 49 45
	α Arietis	E.	64 56 5	63 27 21	61 58 42	60 30 6
	Aldebaran	E.	97 19 53	95 51 58	94 24 7	92 56 19
27	Antares	W.	95 0 18	96 29 7	97 57 55	99 26 41
	α Aquilæ	W.	48 3 55	49 11 24	50 19 41	51 28 44
	Mars	W.	43 55 33	45 20 41	46 45 48	48 10 53
	α Arietis	E.	53 7 56	51 39 38	50 11 23	48 43 11
	Aldebaran	E.	85 37 50	84 10 14	82 42 40	81 15 7
28	Antares	W.	106 50 27	108 19 13	109 48 0	111 16 48
	α Aquilæ	W.	57 23 34	58 36 11	59 49 16	61 2 47
	Mars	W.	55 16 24	56 41 32	58 6 39	59 31 48
	α Arietis	E.	41 22 43	39 54 44	38 26 47	36 58 53
	Aldebaran	E.	73 57 40	72 30 12	71 2 45	69 35 20
29	α Aquilæ	W.	67 16 4	68 31 43	69 47 38	71 3 49
	Mars	W.	66 37 52	68 3 11	69 28 31	70 53 53
	Fomalhaut	W.	42 24 17	43 36 5	44 48 45	46 2 12
	α Arietis	E.	29 40 12	28 12 40	26 45 15	25 17 58
	Aldebaran	E.	62 18 16	60 50 52	59 23 29	57 56 6
	Pollux	E.	104 18 15	102 49 48	101 21 19	99 52 47
30	Mars	W.	78 1 29	79 27 10	80 52 54	82 18 42
	α Aquilæ	W.	77 28 15	78 45 44	80 3 24	81 21 13
	Fomalhaut	W.	52 19 24	53 36 33	54 54 11	56 12 16
	Aldebaran	E.	50 39 23	49 12 5	47 44 50	46 17 38
	Pollux	E.	92 29 19	91 0 27	89 31 31	88 2 31

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Mars	W.	83 44 34	85 10 31	86 36 31	88 2 36
	α Aquilæ	W.	82 39 11	83 57 18	85 15 32	86 33 54
	Fomalhaut	W.	57 30 45	58 49 40	60 8 57	61 28 36
	Aldebaran	E.	44 50 27	43 23 19	41 56 15	40 29 16
	Pollux	E.	86 33 27	85 4 18	83 35 5	82 5 48
2	Mars	W.	95 14 18	96 40 55	98 7 38	99 34 28
	Fomalhaut	W.	68 11 41	69 33 10	70 54 55	72 16 55
	α Pegasi	W.	45 48 19	47 12 24	48 36 52	50 1 43
	Pollux	E.	74 38 3	73 8 14	71 38 18	70 8 15
	Jupiter	E.	103 34 39	102 5 41	100 36 37	99 7 27
	Venus	E.	107 11 54	105 49 3	104 26 6	103 3 3
3	Mars	W.	106 50 22	108 17 56	109 45 38	111 13 28
	Fomalhaut	W.	79 10 22	80 33 42	81 57 14	83 20 58
	α Pegasi	W.	57 10 56	58 37 42	60 4 45	61 32 4
	Pollux	E.	62 36 26	61 5 43	59 34 52	58 3 55
	Jupiter	E.	91 39 41	90 9 43	88 39 36	87 9 20
	Venus	E.	96 6 3	94 42 16	93 18 20	91 54 16
	Saturn	E.	106 5 45	104 35 30	103 5 6	101 34 33
4	Fomalhaut	W.	90 22 24	91 47 12	93 12 9	94 37 16
	α Pegasi	W.	68 52 40	70 21 34	71 50 43	73 20 7
	α Arietis	W.	25 22 0	26 5[illegible] 52	28 24 7	29 55 43
	Pollux	E.	50 26 59	48 55 11	47 23 13	45 51 6
	Jupiter	E.	79 35 31	78 4 13	76 32 44	75 1 3
	Venus	E.	84 51 35	83 26 32	82 1 18	80 35 53
	Regulus	E.	87 12 50	85 40 16	84 7 31	82 34 35
	Saturn	E.	93 59 17	92 27 41	90 55 55	89 23 57
5	α Pegasi	W.	80 50 56	82 21 52	83 53 3	85 24 30
	α Arietis	W.	37 38 28	39 11 56	40 45 42	42 19 45
	Pollux	E.	38 8 24	36 35 29	35 2 27	33 29 17
	Jupiter	E.	67 19 28	65 46 28	64 13 14	62 39 46
	Venus	E.	73 25 45	71 59 5	70 32 11	69 5 2
	Regulus	E.	74 46 43	73 12 28	71 37 59	70 3 15
	Saturn	E.	81 40 55	80 7 38	78 34 7	77 0 22
	Sun	E.	119 16 47	117 50 13	116 23 25	114 56 21
6	α Arietis	W.	50 14 35	51 50 29	53 26 42	55 3 14
	Jupiter	E.	54 48 31	53 13 26	51 38 4	50 2 25
	Venus	E.	61 45 30	60 16 47	58 47 48	57 18 30
	Regulus	E.	62 5 43	60 29 23	58 52 46	57 15 51
	Saturn	E.	69 7 43	67 32 22	65 56 44	64 20 49
	Sun	E.	107 37 2	106 8 19	104 39 19	103 10 0
7	α Arietis	W.	63 10 54	64 49 28	66 28 22	68 7 38
	Aldebaran	W.	31 43 36	33 17 58	34 53 1	36 28 45
	Jupiter	E.	41 59 33	40 22 2	38 44 10	37 5 59
	Regulus	E.	49 6 43	47 27 56	45 48 49	44 9 22
	Venus	E.	49 47 33	48 16 24	46 44 56	45 13 8
	Saturn	E.	56 16 40	54 38 54	53 0 48	51 22 22
	Sun	E.	95 38 41	94 7 26	92 35 51	91 3 55
8	α Arietis	W.	76 29 31	78 11 2	79 52 56	81 35 12

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Mars	W.	89 28 46	90 55 2	92 21 22	93 47 46
	α Aquilæ	W.	87 52 22	89 10 56	90 29 36	91 48 20
	Fomalhaut	W.	62 48 36	64 8 55	65 29 33	66 50 29
	Aldebaran	E.	39 2 23	37 35 35	36 8 56	34 42 26
	Pollux	E.	80 36 26	79 6 58	77 37 25	76 7 47
2	Mars	W.	101 1 25	102 28 28	103 55 38	105 22 56
	Fomalhaut	W.	73 39 9	75 1 38	76 24 20	77 47 15
	α Pegasi	W.	51 26 56	52 52 27	54 18 18	55 44 28
	Pollux	E.	68 38 7	67 7 52	65 37 30	64 7 2
	Jupiter	E.	97 38 10	96 8 44	94 39 11	93 9 30
	Venus	E.	101 39 54	100 16 37	98 53 13	97 29 42
3	Mars	W.	112 41 27	114 9 36	115 37 54	117 6 21
	Fomalhaut	W.	84 44 53	86 9 0	87 33 17	88 57 45
	α Pegasi	W.	62 59 40	64 27 31	65 55 39	67 24 2
	Pollux	E.	56 32 48	55 1 34	53 30 11	51 58 39
	Jupiter	E.	85 38 54	84 8 19	82 37 34	81 6 38
	Venus	E.	90 30 3	89 5 41	87 41 9	86 16 27
	Saturn	E.	100 3 50	98 32 57	97 1 54	95 30 41
4	Fomalhaut	W.	96 2 31	97 27 55	98 53 28	100 19 9
	α Pegasi	W.	74 49 46	76 19 40	77 49 50	79 20 16
	α Arietis	W.	31 27 38	32 59 53	34 32 27	36 5 18
	Pollux	E.	44 18 51	42 46 27	41 13 54	39 41 12
	Jupiter	E.	73 29 10	71 57 4	70 24 45	68 52 14
	Venus	E.	79 10 17	77 44 28	76 18 27	74 52 13
	Regulus	E.	81 1 26	79 28 5	77 54 31	76 20 44
	Saturn	E.	87 51 46	86 19 22	84 46 46	83 13 58
5	α Pegasi	W.	86 56 12	88 28 10	90 0 24	91 32 54
	α Arietis	W.	43 54 7	45 28 47	47 3 45	48 39 1
	Pollux	E.	31 56 1	30 22 38	28 49 9	27 15 33
	Jupiter	E.	61 6 3	59 32 4	57 57 50	56 23 19
	Venus	E.	67 37 39	66 10 0	64 42 6	63 13 56
	Regulus	E.	68 28 16	66 53 2	65 17 32	63 41 46
	Saturn	E.	75 26 22	73 52 6	72 17 35	70 42 47
	Sun	E.	113 29 2	112 1 26	110 33 35	109 5 27
6	α Arietis	W.	56 40 6	58 17 18	59 54 50	61 32 42
	Jupiter	E.	48 26 28	46 50 12	45 13 38	43 36 45
	Venus	E.	55 48 56	54 19 3	52 48 52	51 18 22
	Regulus	E.	55 38 39	54 1 9	52 23 19	50 45 10
	Saturn	E.	62 44 36	61 8 4	59 31 15	57 54 7
	Sun	E.	101 40 23	100 10 27	98 40 11	97 9 35
7	α Arietis	W.	69 47 16	71 27 17	73 7 39	74 48 24
	Aldebaran	W.	38 5 8	39 42 7	41 19 41	42 57 49
	Jupiter	E.	35 27 28	33 48 37	32 9 26	30 29 54
	Regulus	E.	42 29 35	40 49 27	39 8 58	37 28 9
	Venus	E.	43 41 0	42 8 31	40 35 42	39 2 32
	Saturn	E.	49 43 37	48 4 31	46 25 6	44 45 20
	Sun	E.	89 31 38	87 58 59	86 25 59	84 52 37
8	α Arietis	W.	83 17 52	85 0 55	86 44 22	88 28 13

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
8	Aldebaran	W.	44 36 29	46 15 41	47 55 24	49 35 38
	Regulus	E.	35 46 59	34 5 29	32 23 38	30 41 27
	Venus	E.	37 29 1	35 55 8	34 20 55	32 46 21
	Saturn	E.	43 5 15	41 24 50	39 44 4	38 2 58
	Sun	E.	83 18 53	81 44 47	80 10 18	78 35 26
9	α Arietis	W.	90 12 27	91 57 4	93 42 5	95 27 30
	Aldebaran	W.	58 4 7	59 47 13	61 30 46	63 14 46
	Saturn	E.	29 32 54	27 50 3	26 6 59	24 23 44
	Sun	E.	70 35 24	68 58 15	67 20 42	65 42 47
10	α Arietis	W.	104 20 19	106 8 0	107 56 2	109 44 26
	Aldebaran	W.	72 1 16	73 47 48	75 34 44	77 22 4
	Pollux	W.	29 51 2	31 36 51	33 23 16	35 10 13
	Sun	E.	57 27 36	55 47 28	54 7 0	52 26 12
11	Aldebaran	W.	86 24 3	88 13 26	90 3 8	91 53 7
	Pollux	W.	44 12 11	46 1 51	47 51 52	49 42 15
	Sun	E.	43 57 30	42 14 55	40 32 6	38 49 3
16	Sun	W.	26 49 38	28 29 55	30 10 0	31 49 51
	α Aquilæ	E.	75 4 42	73 30 3	71 56 1	70 22 35
	Mars	E.	78 25 3	76 39 51	74 55 1	73 10 37
	Fomalhaut	E.	99 32 22	97 52 26	96 12 45	94 33 20
17	Sun	W.	40 4 41	41 42 36	43 20 9	44 57 18
	α Aquilæ	E.	62 46 10	61 17 20	59 49 24	58 22 26
	Mars	E.	64 34 45	62 51 54	61 11 29	59 30 31
	Fomalhaut	E.	86 21 36	84 44 29	83 7 48	81 31 35
18	Sun	W.	52 56 56	54 31 36	56 5 51	57 39 40
	Mars	E.	51 12 40	49 34 29	47 56 46	46 19 32
	Fomalhaut	E.	73 38 11	72 5 9	70 32 42	69 0 51
	α Pegasi	E.	94 11 43	92 32 39	90 54 1	89 15 48
19	Sun	W.	65 22 26	66 53 44	68 24 38	69 55 8
	Antares	W.	23 56 56	25 36 7	27 14 52	28 53 13
	Mars	E.	38 20 24	36 45 58	35 12 0	33 38 29
	Fomalhaut	E.	61 31 13	60 3 20	58 36 11	57 9 48
	α Pegasi	E.	81 11 15	79 35 40	78 0 30	76 25 47
20	Sun	W.	77 21 47	78 49 59	80 17 50	81 45 19
	Antares	W.	36 59 5	38 35 7	40 10 48	41 46 8
	Fomalhaut	E.	50 10 4	48 48 49	47 28 32	46 9 17
	α Pegasi	E.	68 38 47	67 6 42	65 35 4	64 3 52
21	Sun	W.	88 57 50	90 23 23	91 48 39	93 13 39
	Antares	W.	49 37 46	51 11 9	52 44 15	54 17 4
	α Pegasi	E.	56 34 30	55 5 59	53 37 55	52 10 18
	α Arietis	E.	98 18 16	96 45 14	95 12 29	93 40 0
22	Sun	W.	100 14 45	101 38 15	103 1 32	104 24 37
	Antares	W.	61 57 17	63 28 37	64 59 44	66 30 39
	α Pegasi	E.	44 59 39	43 35 5	42 11 5	40 47 42
	α Arietis	E.	86 1 28	84 30 29	82 59 43	81 29 8

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
8	Aldebaran	W.	51° 16′ 21″	52° 57′ 35″	54° 39′ 18″	56° 21′ 28″
	Regulus	E.	28 58 56	27 16 6	25 32 57	23 49 30
	Venus	E.	31 11 25	29 36 9	28 0 32	26 24 34
	Saturn	E.	36 21 34	34 39 50	32 57 48	31 15 29
	Sun	E.	77 0 12	75 24 35	73 48 34	72 12 11
9	α Arietis	W.	97 13 18	98 59 30	100 46 4	102 33 0
	Aldebaran	W.	64 59 13	66 44 7	68 29 26	70 15 9
	Saturn	E.	22 40 23	20 57 0	19 13 38	17 30 23
	Sun	E.	64 4 30	62 25 50	60 46 46	59 7 22
10	α Arietis	W.	111 33 11	113 22 16	115 11 41	117 1 24
	Aldebaran	W.	79 9 45	80 57 48	82 46 12	84 34 58
	Pollux	W.	36 57 42	38 45 39	40 34 5	42 22 55
	Sun	E.	50 45 4	49 3 37	47 21 52	45 39 49
11	Aldebaran	W.	93 43 23	95 33 54	97 24 39	99 15 38
	Pollux	W.	51 32 57	53 23 59	55 15 18	57 6 55
	Sun	E.	37 5 49	35 22 24	33 38 49	31 55 8
16	Sun	W.	33 29 28	35 8 45	36 47 44	38 26 23
	α Aquilæ	E.	68 49 49	67 17 45	65 46 26	64 15 53
	Mars	E.	71 26 35	69 43 0	67 59 49	66 17 4
	Fomalhaut	E.	92 54 14	91 15 30	89 37 8	87 59 9
17	Sun	W.	46 34 3	48 10 23	49 46 19	51 21 50
	α Aquilæ	E.	56 56 28	55 31 33	54 7 45	52 45 8
	Mars	E.	57 50 1	56 10 0	54 30 25	52 51 18
	Fomalhaut	E.	79 55 52	78 20 38	76 45 56	75 11 46
18	Sun	W.	59 13 4	60 46 2	62 18 35	63 50 43
	Mars	E.	44 42 47	43 6 29	41 30 39	39 55 17
	Fomalhaut	E.	67 29 37	65 59 2	64 29 5	62 59 49
	α Pegasi	E.	87 38 2	86 0 41	84 23 46	82 47 17
19	Sun	W.	71 25 14	72 54 56	74 24 15	75 53 12
	Antares	W.	30 31 10	32 8 44	33 45 53	35 22 40
	Mars	E.	32 5 26	30 32 52	29 0 46	27 29 8
	Fomalhaut	E.	55 44 10	54 19 22	52 55 23	51 32 17
	α Pegasi	E.	74 51 30	73 17 40	71 44 16	70 11 18
20	Sun	W.	83 12 29	84 39 18	86 5 47	87 31 58
	Antares	W.	43 21 7	44 55 45	46 30 4	48 4 4
	Fomalhaut	E.	44 51 7	43 34 6	42 18 17	41 3 46
	α Pegasi	E.	62 33 6	61 2 47	59 32 54	58 3 29
21	Sun	W.	94 38 23	96 2 51	97 27 4	98 51 2
	Antares	W.	55 49 37	57 21 54	58 53 57	60 25 44
	α Pegasi	E.	50 43 11	49 16 33	47 50 24	46 24 46
	α Arietis	E.	92 7 47	90 35 50	89 4 8	87 32 41
22	Sun	W.	105 47 29	107 10 9	108 32 39	109 54 59
	Antares	W.	68 1 22	69 31 53	71 2 14	72 32 26
	α Pegasi	E.	39 24 56	38 2 51	36 41 28	35 20 53
	α Arietis	E.	79 58 46	78 28 35	76 58 35	75 28 45

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
23	Sun	W.	111 17 9	112 39 9	114 1 0	115 22 44
	Antares	W.	74 2 27	75 32 19	77 2 3	78 31 40
	α Arietis	E.	73 59 6	72 29 35	71 0 13	69 31 0
24	Sun	W.	122 9 32	123 30 36	124 51 34	126 12 27
	Antares	W.	85 57 59	87 26 59	88 55 54	90 24 46
	Mars	W.	21 19 42	22 42 58	24 6 19	25 29 43
	α Arietis	E.	62 6 39	60 38 5	59 9 37	57 41 13
	Aldebaran	E.	94 34 56	93 7 7	91 39 21	90 11 39
25	Antares	W.	97 48 23	99 17 1	100 45 39	102 14 16
	α Aquilæ	W.	50 6 50	51 15 58	52 25 48	53 36 18
	Mars	W.	32 27 22	33 50 59	35 14 38	36 38 19
	α Arietis	E.	50 20 9	48 52 5	47 24 4	45 56 5
	Aldebaran	E.	82 53 49	81 26 21	79 58 55	78 31 30
26	α Aquilæ	W.	59 37 13	60 50 52	62 4 57	63 19 26
	Mars	W.	43 37 16	45 1 11	46 25 10	47 49 12
	α Arietis	E.	38 36 35	37 8 46	35 40 57	34 13 11
	Aldebaran	E.	71 14 26	69 47 0	68 19 34	66 52 7
	Pollux	E.	113 18 14	111 50 7	110 21 56	108 53 42
27	α Aquilæ	W.	69 37 11	70 53 41	72 10 28	73 27 30
	Mars	W.	54 50 21	56 14 48	57 39 19	59 3 56
	Fomalhaut	W.	44 42 1	45 55 15	47 9 16	48 23 59
	Aldebaran	E.	59 34 31	58 6 55	56 39 18	55 11 40
	Pollux	E.	101 31 35	100 2 56	98 34 14	97 5 25
28	α Aquilæ	W.	79 56 12	81 14 34	82 33 6	83 51 49
	Mars	W.	66 8 26	67 33 38	68 58 56	70 24 21
	Fomalhaut	W.	54 47 1	56 5 14	57 23 56	58 43 4
	Aldebaran	E.	47 53 12	46 25 28	44 57 46	43 30 3
	Pollux	E.	89 40 2	88 10 39	86 41 10	85 11 36
29	Mars	W.	77 33 11	78 59 19	80 25 34	81 51 58
	Fomalhaut	W.	65 24 39	66 46 1	68 7 43	69 29 42
	α Pegasi	W.	42 58 53	44 22 50	45 47 15	47 12 7
	Aldebaran	E.	36 12 12	34 44 54	33 17 44	31 50 46
	Pollux	E.	77 42 0	76 11 44	74 41 20	73 10 50
	Jupiter	E.	110 45 48	109 16 3	107 46 11	106 16 11
30	Mars	W.	89 5 53	90 33 5	92 0 25	93 27 54
	Fomalhaut	W.	76 23 43	77 47 16	79 11 2	80 35 0
	α Pegasi	W.	54 22 10	55 49 13	57 16 34	58 44 13
	Pollux	E.	65 36 28	64 5 13	62 33 51	61 2 20
	Jupiter	E.	98 44 2	97 13 11	95 42 11	94 11 3
	Saturn	E.	111 44 6	110 13 11	108 42 6	107 10 52
31	Mars	W.	100 47 29	102 15 51	103 44 22	105 13 3
	α Pegasi	W.	66 6 32	67 35 46	69 5 14	70 34 56
	α Arietis	W.	22 31 52	24 2 42	25 33 55	27 5 31
	Pollux	E.	53 22 56	51 50 42	50 18 20	48 45 51
	Jupiter	E.	86 33 1	85 0 56	83 28 41	81 56 17
	Regulus	E.	90 9 24	88 36 24	87 3 15	85 29 57
	Saturn	E.	99 32 22	98 0 12	96 27 52	94 55 21

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
23	Sun	W.	116 44 19	118 5 47	119 27 8	120 48 23
	Antares	W.	81 1 8	81 30 30	82 59 46	84 28 54
	α Arietis	E.	68 1 54	66 32 56	65 4 3	63 35 18
24	Sun	W.	127 33 16	128 54 1	130 14 43	131 35 21
	Antares	W.	91 53 34	93 22 19	94 51 2	96 19 43
	Mars	W.	26 53 11	28 16 41	29 40 12	31 3 46
	α Arietis	E.	56 12 53	54 44 37	53 16 25	51 48 16
	Aldebaran	E.	88 44 0	87 16 24	85 48 50	84 21 19
25	Antares	W.	103 42 53	105 11 31	106 40 10	108 8 50
	α Aquilæ	W.	54 47 24	55 59 5	57 11 18	58 24 1
	Mars	W.	38 2 1	39 25 46	40 49 34	42 13 24
	α Arietis	E.	44 28 8	43 0 13	41 32 19	40 4 27
	Aldebaran	E.	77 4 5	75 36 40	74 9 16	72 41 51
26	α Aquilæ	W.	64 34 18	65 49 31	67 5 5	68 21 59
	Mars	W.	49 13 17	50 37 27	52 1 41	53 25 59
	α Arietis	E.	32 45 27	31 17 45	29 50 6	28 22 31
	Aldebaran	E.	65 24 38	63 57 9	62 29 38	61 2 5
	Pollux	E.	107 25 25	105 57 4	104 28 38	103 0 9
27	α Aquilæ	W.	74 44 47	76 2 19	77 20 4	78 38 2
	Mars	W.	60 28 38	61 53 27	63 18 20	64 43 20
	Fomalhaut	W.	49 39 24	50 55 27	52 12 6	53 29 17
	Aldebaran	E.	53 44 1	52 16 20	50 48 38	49 20 55
	Pollux	E.	95 36 32	94 7 33	92 38 28	91 9 19
28	α Aquilæ	W.	85 10 41	86 29 42	87 48 52	89 8 10
	Mars	W.	71 49 53	73 15 32	74 41 18	76 7 11
	Fomalhaut	W.	60 2 37	61 22 35	62 42 56	64 3 38
	Aldebaran	E.	42 2 22	40 34 43	39 7 9	37 39 38
	Pollux	E.	83 41 54	82 12 5	80 42 10	79 12 9
29	Mars	W.	83 18 29	84 45 8	86 11 55	87 38 50
	Fomalhaut	W.	70 51 58	72 14 31	73 37 20	75 0 24
	α Pegasi	W.	48 37 23	50 3 2	51 29 4	52 55 27
	Aldebaran	E.	30 24 2	28 57 35	27 31 28	26 5 48
	Pollux	E.	71 40 13	70 9 28	68 38 35	67 7 35
	Jupiter	E.	104 46 2	103 15 45	101 45 19	100 14 45
30	Mars	W.	94 55 31	96 23 17	97 51 12	99 19 16
	Fomalhaut	W.	81 59 11	83 23 34	84 48 7	86 12 51
	α Pegasi	W.	60 12 9	61 40 21	63 8 49	64 37 33
	Pollux	E.	59 30 42	57 58 57	56 27 4	54 55 4
	Jupiter	E.	92 39 45	91 8 18	89 36 42	88 4 56
	Saturn	E.	105 39 29	104 7 56	102 36 14	101 4 23
31	Mars	W.	106 41 53	108 10 52	109 40 1	111 9 19
	α Pegasi	W.	72 4 51	73 35 0	75 5 22	76 35 57
	α Arietis	W.	28 37 28	30 9 44	31 42 18	33 15 9
	Pollux	E.	47 13 15	45 40 32	44 7 43	42 34 48
	Jupiter	E.	80 23 43	78 50 59	77 18 5	75 45 1
	Regulus	E.	83 56 29	82 22 51	80 49 3	79 15 5
	Saturn	E.	93 22 41	91 49 51	90 16 51	88 43 41

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	*a* Pegasi	W.	78 6 45	79 37 45	81 8 58	82 40 23
	a Arietis	W.	34 48 17	36 21 40	37 55 18	39 29 11
	Pollux	E.	41 1 48	39 28 41	37 55 30	36 22 14
	Jupiter	E.	74 11 47	72 38 22	71 4 47	69 31 1
	Regulus	E.	77 40 57	76 6 39	74 32 10	72 57 30
	Saturn	E.	87 10 20	85 36 49	84 3 8	82 29 15
	Venus	E.	105 43 21	104 17 56	102 52 21	101 26 36
2	*a* Pegasi	W.	90 20 25	91 52 59	93 25 44	94 58 41
	a Arietis	W.	47 22 9	48 57 26	50 32 57	52 8 42
	Jupiter	E.	61 39 27	60 4 35	58 29 30	56 54 14
	Regulus	E.	65 1 29	63 25 43	61 49 45	60 13 36
	Saturn	E.	74 37 11	73 2 13	71 27 3	69 51 41
	Venus	E.	94 15 4	92 48 12	91 21 9	89 53 54
3	*a* Arietis	W.	60 10 51	61 47 58	63 25 20	65 2 56
	Aldebaran	W.	28 45 56	30 18 15	31 51 16	33 24 54
	Jupiter	E.	48 54 55	47 18 26	45 41 44	44 4 50
	Regulus	E.	52 9 50	50 32 28	48 54 53	47 17 6
	Saturn	E.	61 51 56	60 15 21	58 38 35	57 1 37
	Venus	E.	82 34 41	81 6 14	79 37 34	78 8 41
	Sun	E.	125 34 3	124 4 29	122 34 40	121 4 37
4	*a* Arietis	W.	73 14 36	74 53 41	76 33 1	78 12 37
	Aldebaran	W.	41 21 6	42 57 43	44 34 45	46 12 12
	Jupiter	E.	35 57 8	34 18 57	32 40 34	31 1 59
	Regulus	E.	39 4 53	37 25 47	35 46 29	34 6 57
	Saturn	E.	48 53 32	47 15 17	45 36 49	43 58 8
	Venus	E.	70 41 0	69 10 47	67 40 20	66 9 40
	Sun	E.	113 30 39	111 59 6	110 27 17	108 55 13
5	*a* Arietis	W.	86 34 33	88 15 45	89 57 13	91 38 57
	Aldebaran	W.	54 25 0	56 4 38	57 44 36	59 24 55
	Saturn	E.	35 41 40	34 1 48	32 21 46	30 41 35
	Venus	E.	58 32 45	57 0 40	55 28 21	53 55 47
	Sun	E.	101 10 55	99 37 13	98 3 16	96 29 2
6	Aldebaran	W.	67 51 29	69 33 47	71 16 23	72 59 19
	Pollux	W.	25 50 20	27 31 3	29 12 23	30 54 17
	Venus	E.	46 9 27	44 35 30	43 1 20	41 26 58
	Sun	E.	88 33 37	86 57 40	85 21 26	83 44 56
7	Aldebaran	W.	81 38 36	83 23 21	85 8 23	86 53 43
	Pollux	W.	39 31 1	41 15 39	43 0 40	44 46 3
	Venus	E.	33 32 31	31 57 13	30 21 50	28 46 26
	Sun	E.	75 38 3	73 59 49	72 21 19	70 42 33
8	Aldebaran	W.	95 44 25	97 31 19	99 18 27	101 5 49
	Pollux	W.	53 38 2	55 25 22	57 13 0	59 0 54
	Jupiter	W.	19 19 40	21 5 48	22 52 22	24 39 22
	Regulus	W.	16 38 26	18 24 55	20 11 58	21 59 29
	Sun	E.	62 24 42	60 44 23	59 3 48	57 23 3
9	Pollux	W.	68 4 13	69 53 33	71 43 6	73 32 49
	Jupiter	W.	33 39 20	35 28 9	37 17 11	39 6 27

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	*a* Pegasi	W.	84 12 0	85 43 49	87 15 49	88 48 1
	a Arietis	W.	41 3 19	42 37 40	44 12 16	45 47 6
	Pollux	E.	34 48 55	33 15 33	31 42 10	30 8 47
	Jupiter	E.	67 57 4	66 22 56	64 48 38	63 14 8
	Regulus	E.	71 22 40	69 47 39	68 12 27	66 37 3
	Saturn	E.	80 55 12	79 20 59	77 46 34	76 11 58
	Venus	E.	100 0 39	98 34 31	97 8 13	95 41 44
2	*a* Pegasi	W.	96 31 49	98 5 7	99 38 36	101 12 15
	a Arietis	W.	53 44 40	55 20 52	56 57 18	58 33 57
	Jupiter	E.	55 18 47	53 43 7	52 7 15	50 31 11
	Regulus	E.	58 37 15	57 0 42	55 23 57	53 47 0
	Saturn	E.	68 16 8	66 40 23	65 4 26	63 28 17
	Venus	E.	88 26 28	86 58 49	85 30 59	84 2 56
3	*a* Arietis	W.	66 40 46	68 18 51	69 57 11	71 35 46
	Aldebaran	W.	34 59 8	36 33 55	38 9 11	39 44 55
	Jupiter	E.	42 27 43	40 50 23	39 12 51	37 35 6
	Regulus	E.	45 39 5	44 0 51	42 22 25	40 43 45
	Saturn	E.	55 24 25	53 47 0	52 9 24	50 31 34
	Venus	E.	76 39 35	75 10 16	73 40 44	72 10 59
	Sun	E.	119 34 19	118 3 46	116 32 59	115 1 56
4	*a* Arietis	W.	79 52 28	81 32 36	83 12 59	84 53 38
	Aldebaran	W.	47 50 1	49 28 13	51 6 47	52 45 43
	Jupiter	E.	29 23 12	27 44 13	26 5 3	24 25 43
	Regulus	E.	32 27 13	30 47 16	29 7 7	27 26 46
	Saturn	E.	42 19 14	40 40 9	39 0 52	37 21 22
	Venus	E.	64 38 46	63 7 38	61 36 15	60 4 37
	Sun	E.	107 22 54	105 50 19	104 17 27	102 44 19
5	*a* Arietis	W.	93 20 59	95 3 17	96 45 52	98 28 44
	Aldebaran	W.	61 5 35	62 46 34	64 27 52	66 9 31
	Saturn	E.	29 1 16	27 20 50	25 40 21	23 59 50
	Venus	E.	52 22 59	50 49 56	49 16 40	47 43 10
	Sun	E.	94 54 31	93 19 43	91 44 38	90 9 16
6	Aldebaran	W.	74 42 34	76 26 7	78 9 59	79 54 9
	Pollux	W.	32 36 43	34 19 38	36 3 0	37 46 48
	Venus	E.	39 52 25	38 17 40	36 42 45	35 7 42
	Sun	E.	82 8 8	80 31 2	78 53 39	77 16 0
7	Aldebaran	W.	88 39 19	90 25 12	92 11 21	93 57 46
	Pollux	W.	46 31 47	48 17 51	50 4 15	51 51 0
	Venus	E.	27 11 2	25 35 41	24 0 29	22 25 31
	Sun	E.	69 3 30	67 24 11	65 44 37	64 4 47
8	Aldebaran	W.	102 53 24	104 41 11	106 29 10	108 17 19
	Pollux	W.	60 49 4	62 37 30	64 26 11	66 15 5
	Jupiter	W.	26 26 44	28 14 26	30 2 27	31 50 45
	Regulus	W.	23 47 26	25 35 45	27 24 25	29 13 23
	Sun	E.	55 42 2	54 0 50	52 19 26	50 37 50
9	Pollux	W.	75 22 43	77 12 46	79 2 58	80 53 17
	Jupiter	W.	40 55 53	42 45 30	44 35 17	46 25 13

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIʰ.	VIʰ.	IXʰ.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
9	Regulus	W.	31 2 37	32 52 7	34 41 51	36 31 47
	Saturn	W.	21 21 22	23 8 3	24 55 18	26 43 4
	Sun	E.	48 56 4	47 14 8	45 32 3	43 49 50
10	Pollux	W.	82 43 44	84 34 17	86 24 54	88 15 35
	Jupiter	W.	48 15 16	50 5 27	51 55 44	53 46 5
	Regulus	W.	45 44 13	47 35 6	49 26 6	51 17 11
	Saturn	W.	35 47 6	37 36 39	39 26 22	41 16 14
	Sun	E.	35 17 24	33 34 48	31 52 12	30 9 40
14	Sun	W.	20 6 45	21 42 56	23 19 3	24 55 5
	Mars	E.	73 25 58	71 44 51	70 4 7	68 23 46
	Fomalhaut	E.	79 9 8	77 32 36	75 56 33	74 20 59
	a Pegasi	E.	99 56 18	98 13 53	96 31 46	94 50 0
15	Sun	W.	32 51 59	34 26 32	36 0 45	37 34 37
	Mars	E.	60 8 1	58 30 6	56 52 36	55 15 32
	Fomalhaut	E.	66 31 14	64 59 6	63 27 36	61 56 47
	a Pegasi	E.	86 26 36	84 47 6	83 8 0	81 29 20
16	Sun	W.	45 18 36	46 50 16	48 21 34	49 52 30
	Mars	E.	47 16 40	45 42 12	44 8 9	42 34 33
	Fomalhaut	E.	54 34 2	53 7 59	51 42 51	50 18 41
	a Pegasi	E.	73 22 29	71 46 29	70 10 55	68 35 50
17	Sun	W.	57 21 33	58 50 15	60 18 36	61 46 36
	Mars	E.	34 53 8	33 22 10	31 51 39	30 21 34
	a Pegasi	E.	60 47 33	59 15 22	57 43 41	56 12 30
	a Arietis	E.	102 46 49	101 10 32	99 34 36	97 59 2
18	Sun	W.	69 1 30	70 27 31	71 53 13	73 18 37
	a Pegasi	E.	48 44 32	47 16 37	45 49 17	44 22 33
	a Arietis	E.	90 6 24	88 32 52	86 59 38	85 26 43
19	Sun	W.	80 21 26	81 45 14	83 8 47	84 32 6
	a Arietis	E.	77 46 25	76 15 9	74 44 7	73 13 20
	Aldebaran	E.	110 9 51	108 39 33	107 9 28	105 39 35
20	Sun	W.	91 25 41	92 47 51	94 9 52	95 31 45
	a Arietis	E.	65 42 34	64 13 0	62 43 35	61 14 21
	Aldebaran	E.	98 12 59	96 44 10	95 15 30	93 46 59
21	Sun	W.	102 19 9	103 40 19	105 1 24	106 22 25
	a Aquilæ	W.	47 14 56	48 22 40	49 31 12	50 40 28
	a Arietis	E.	53 50 12	52 21 44	50 53 23	49 25 6
	Aldebaran	E.	86 26 13	84 58 23	83 30 37	82 2 56
22	Sun	W.	113 6 48	114 27 35	115 48 22	117 9 10
	a Aquilæ	W.	56 36 6	57 48 50	59 2 1	60 15 39
	Mars	W.	23 30 3	24 52 16	26 14 38	27 37 7
	a Arietis	E.	42 4 51	40 36 59	39 9 10	37 41 24
	Aldebaran	E.	74 45 22	73 17 58	71 50 36	70 23 14
23	Sun	W.	123 53 24	125 14 22	126 35 23	127 56 28
	a Aquilæ	W.	66 29 34	67 45 23	69 1 31	70 17 56

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
9	Regulus	W.	38 21 57	40 12 17	42 2 47	43 53 26
	Saturn	W.	28 31 15	30 19 47	32 8 38	33 57 45
	Sun	E.	42 7 30	40 25 5	38 42 35	37 0 0
10	Pollux	W.	90 6 19	91 57 5	93 47 52	95 38 39
	Jupiter	W.	55 36 30	57 26 59	59 17 29	61 8 0
	Regulus	W.	53 8 19	54 59 30	56 50 43	58 41 57
	Saturn	W.	43 6 14	44 56 19	46 46 29	48 36 41
	Sun	E.	28 27 12	26 44 52	25 2 42	23 20 46
14	Sun	W.	26 30 57	28 6 36	29 42 0	31 17 9
	Mars	E.	66 43 49	65 4 16	63 25 6	61 46 21
	Fomalhaut	E.	72 45 54	71 11 22	69 37 24	68 4 1
	a Pegasi	E.	93 8 34	91 27 30	89 46 49	88 6 30
15	Sun	W.	39 8 8	40 41 18	42 14 6	43 46 32
	Mars	E.	53 38 53	52 2 41	50 26 55	48 51 34
	Fomalhaut	E.	60 26 41	58 57 20	57 28 45	56 0 58
	a Pegasi	E.	79 51 4	78 13 16	76 35 53	74 58 58
16	Sun	W.	51 23 4	52 53 14	54 23 2	55 52 29
	Mars	E.	41 1 23	39 28 39	37 56 22	36 24 32
	Fomalhaut	E.	48 55 30	47 33 24	46 12 25	44 52 36
	a Pegasi	E.	67 1 13	65 27 5	63 53 25	62 20 15
17	Sun	W.	63 14 15	64 41 33	66 8 31	67 35 10
	Mars	E.	28 51 57	27 22 47	25 54 6	24 25 54
	a Pegasi	E.	54 41 50	53 11 41	51 42 5	50 13 1
	a Arietis	E.	96 23 49	94 48 58	93 14 26	91 40 15
18	Sun	W.	74 43 43	76 8 33	77 33 6	78 57 24
	a Pegasi	E.	42 56 27	41 31 1	40 6 16	38 42 15
	a Arietis	E.	83 54 6	82 21 46	80 49 43	79 17 56
19	Sun	W.	85 55 13	87 18 7	88 40 49	90 3 20
	a Arietis	E.	71 42 46	70 12 25	68 42 17	67 12 20
	Aldebaran	E.	104 9 54	102 40 23	101 11 5	99 41 57
20	Sun	W.	96 53 26	98 15 2	99 36 31	100 57 53
	a Arietis	E.	59 45 15	58 16 18	56 47 29	55 18 47
	Aldebaran	E.	92 18 36	90 50 20	89 22 11	87 54 9
21	Sun	W.	107 43 23	109 4 18	110 25 9	111 45 59
	a Aquilæ	W.	51 50 24	53 0 59	54 12 8	55 23 51
	a Arietis	E.	47 56 55	46 28 48	45 0 45	43 32 46
	Aldebaran	E.	80 35 19	79 7 45	77 40 15	76 12 48
22	Sun	W.	118 29 57	119 50 46	121 11 36	122 32 28
	a Aquilæ	W.	61 29 41	62 44 7	63 58 55	65 14 4
	Mars	W.	28 59 44	30 22 27	31 45 18	33 8 15
	a Arietis	E.	36 13 40	34 45 59	33 18 21	31 50 46
	Aldebaran	E.	68 55 53	67 28 32	66 1 11	64 33 50
23	Sun	W.	129 17 37	130 38 51	132 0 9	133 21 33
	a Aquilæ	W.	71 34 39	72 51 38	74 8 53	75 26 22

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
23	Fomalhaut	W.	41 56 24	43 7 5	44 18 42	45 31 11
	Mars	W.	34 31 19	35 54 29	37 17 46	38 41 9
	Aldebaran	E.	63 6 27	61 39 3	60 11 38	58 44 12
	Pollux	E.	105 2 54	103 34 38	102 6 18	100 37 54
24	α Aquilæ	W.	76 44 7	78 2 6	79 20 18	80 38 43
	Fomalhaut	W.	51 44 47	53 1 27	54 18 40	55 36 27
	Mars	W.	45 39 58	47 4 7	48 28 25	49 52 50
	α Pegasi	W.	29 0 5	30 16 8	31 33 27	32 51 51
	Aldebaran	E.	51 26 30	49 58 51	48 31 10	47 3 27
	Pollux	E.	93 14 28	91 45 27	90 16 19	88 47 4
25	α Aquilæ	W.	87 13 48	88 33 22	89 53 4	91 12 56
	Fomalhaut	W.	62 12 29	63 33 0	64 53 54	66 15 12
	Mars	W.	56 57 22	58 22 46	59 48 19	61 14 3
	α Pegasi	W.	39 36 28	40 59 30	42 23 7	43 47 17
	Aldebaran	E.	39 44 35	38 16 50	36 49 7	35 21 28
	Pollux	E.	81 18 44	79 48 37	78 18 20	76 47 54
	Jupiter	E.	116 51 47	115 21 43	113 51 27	112 21 1
26	Fomalhaut	W.	73 6 54	74 30 13	75 53 49	77 17 44
	Mars	W.	68 25 33	69 52 26	71 19 29	72 46 46
	α Pegasi	W.	50 55 20	52 22 15	53 49 34	55 17 14
	Pollux	E.	69 13 13	67 41 45	66 10 7	64 38 18
	Jupiter	E.	104 46 8	103 14 35	101 42 49	100 10 51
	Saturn	E.	117 3 31	115 32 11	114 0 38	112 28 52
27	Fomalhaut	W.	84 21 12	85 46 38	87 12 18	88 38 10
	Mars	W.	80 6 10	81 34 41	83 3 23	84 32 18
	α Pegasi	W.	62 40 50	64 10 32	65 40 31	67 10 49
	Pollux	E.	56 56 32	55 23 38	53 50 35	52 17 21
	Jupiter	E.	92 28 2	90 54 50	89 21 25	87 47 47
	Regulus	E.	93 44 34	92 10 59	90 37 12	89 3 12
	Saturn	E.	104 46 56	103 13 54	101 40 39	100 7 12
28	Fomalhaut	W.	95 50 15	97 17 9	98 44 11	100 11 21
	Mars	W.	92 0 2	93 30 13	95 0 36	96 31 11
	α Pegasi	W.	74 46 31	76 18 27	77 50 38	79 23 3
	α Arietis	W.	31 22 31	32 56 41	34 31 9	36 5 56
	Pollux	E.	44 28 46	42 54 36	41 20 19	39 45 55
	Jupiter	E.	79 56 31	78 21 38	76 46 32	75 11 13
	Regulus	E.	81 10 2	79 34 46	77 59 18	76 23 37
	Saturn	E.	92 16 43	90 41 59	89 7 2	87 31 53
29	Mars	W.	104 7 11	105 38 59	107 10 58	108 43 9
	α Arietis	W.	44 3 55	45 40 17	47 16 53	48 53 43
	Jupiter	E.	67 11 34	65 35 1	63 58 16	62 21 20
	Regulus	E.	68 22 11	66 45 17	65 8 12	63 30 54
	Saturn	E.	79 32 59	77 56 36	76 20 1	74 43 14
30	α Arietis	W.	57 1 18	58 39 28	60 17 50	61 56 24
	Aldebaran	W.	25 43 24	27 15 36	28 48 39	30 22 25
	Jupiter	E.	54 13 46	52 35 42	50 57 27	49 19 2
	Regulus	E.	55 21 36	53 43 11	52 4 35	50 25 49
	Saturn	E.	66 36 29	64 58 35	63 20 31	61 42 16

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
23	Fomalhaut	W.	46 44 28	47 58 31	49 13 17	50 28 42
	Mars	W.	40 4 40	41 28 19	42 52 4	44 15 56
	Aldebaran	E.	57 16 44	55 49 13	54 21 41	52 54 6
	Pollux	E.	99 9 24	97 40 49	96 12 9	94 43 21
24	*a* Aquilæ	W.	81 57 20	83 16 10	84 35 12	85 54 25
	Fomalhaut	W.	56 54 43	58 13 29	59 32 42	60 52 23
	Mars	W.	51 17 26	52 42 11	54 7 5	55 32 8
	a Pegasi	W.	34 11 11	35 31 21	36 52 18	38 14 1
	Aldebaran	E.	45 35 43	44 7 57	42 40 10	41 12 22
	Pollux	E.	87 17 42	85 48 10	84 18 30	82 48 42
25	*a* Aquilæ	W.	92 32 56	93 53 4	95 13 19	96 33 42
	Fomalhaut	W.	67 36 51	68 58 52	70 21 13	71 43 54
	Mars	W.	62 39 59	64 6 6	65 32 23	66 58 53
	a Pegasi	W.	45 11 57	46 37 7	48 2 46	49 28 50
	Aldebaran	E.	33 53 54	32 26 28	30 59 11	29 32 7
	Pollux	E.	75 17 19	73 46 33	72 15 37	70 44 30
	Jupiter	E.	110 50 25	109 19 38	107 48 39	106 17 29
26	Fomalhaut	W.	78 41 54	80 6 21	81 31 4	82 56 0
	Mars	W.	74 14 14	75 41 55	77 9 48	78 37 52
	a Pegasi	W.	56 45 16	58 13 40	59 42 24	61 11 28
	Pollux	E.	63 6 18	61 34 7	60 1 46	58 29 15
	Jupiter	E.	98 38 42	97 6 20	95 33 47	94 1 1
	Saturn	E.	110 56 54	109 24 43	107 52 20	106 19 45
27	Fomalhaut	W.	90 4 12	91 30 28	92 56 54	94 23 30
	Mars	W.	86 1 26	87 30 47	89 0 20	90 30 4
	a Pegasi	W.	68 41 24	70 12 16	71 43 25	73 14 50
	Pollux	E.	50 43 57	49 10 23	47 36 40	46 2 48
	Jupiter	E.	86 13 57	84 39 55	83 5 40	81 31 11
	Regulus	E.	87 28 59	85 54 34	84 19 56	82 45 6
	Saturn	E.	98 33 32	96 59 39	95 25 33	93 51 14
28	Fomalhaut	W.	101 38 36	103 5 57	104 33 22	106 0 51
	Mars	W.	98 1 59	99 32 59	101 4 11	102 35 35
	a Pegasi	W.	80 55 43	82 28 37	84 1 45	85 35 5
	a Arietis	W.	37 40 59	39 16 19	40 51 56	42 27 48
	Pollux	E.	38 11 24	36 36 48	35 2 8	33 27 23
	Jupiter	E.	73 35 42	71 59 59	70 24 3	68 47 54
	Regulus	E.	74 47 45	73 11 40	71 35 22	69 58 52
	Saturn	E.	85 56 31	84 20 56	82 45 9	81 9 10
29	Mars	W.	110 15 31	111 48 5	113 20 50	114 53 46
	a Arietis	W.	50 30 48	52 8 6	53 45 37	55 23 21
	Jupiter	E.	60 44 12	59 6 53	57 29 22	55 51 39
	Regulus	E.	61 53 25	60 15 45	58 37 53	56 59 50
	Saturn	E.	73 6 16	71 29 6	69 51 44	68 14 12
30	*a* Arietis	W.	63 35 11	65 14 9	66 53 19	68 32 40
	Aldebaran	W.	31 56 52	33 31 54	35 7 28	36 43 32
	Jupiter	E.	47 40 27	46 1 42	44 22 47	42 43 42
	Regulus	E.	48 46 52	47 7 45	45 28 28	43 49 2
	Saturn	E.	60 3 50	58 25 15	56 46 30	55 7 35

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	α Arietis	W.	70 12 13	71 51 58	73 31 54	75 12 0
	Aldebaran	W.	38 20 3	39 56 58	41 34 16	43 11 57
	Jupiter	E.	41 4 27	39 25 4	37 45 32	36 5 53
	Regulus	E.	42 9 26	40 29 40	38 49 46	37 9 44
	Saturn	E.	53 28 31	51 49 18	50 9 56	48 30 27
	Spica	E.	96 10 45	94 30 45	92 50 34	91 10 13
2	α Arietis	W.	83 35 12	85 16 22	86 57 41	88 39 10
	Aldebaran	W.	51 25 1	53 4 28	54 44 10	56 24 7
	Saturn	E.	40 11 5	38 30 53	36 50 37	35 10 16
	Spica	E.	82 45 51	81 4 28	79 22 56	77 41 14
	Venus	E.	93 38 4	92 6 24	90 34 35	89 2 35
	Sun	E.	131 28 25	129 54 49	128 21 3	126 47 7
3	α Arietis	W.	97 9 2	98 51 29	100 34 5	102 16 51
	Aldebaran	W.	64 47 14	66 28 30	68 9 57	69 51 36
	Spica	E.	69 10 19	67 27 40	65 44 51	64 1 53
	Venus	E.	81 20 14	79 47 17	78 14 12	76 40 59
	Sun	E.	118 54 43	117 19 43	115 44 34	114 9 14
4	Aldebaran	W.	78 22 33	80 5 17	81 48 10	83 31 12
	Pollux	W.	36 20 7	38 2 24	39 44 57	41 27 47
	Spica	E.	55 24 49	53 40 58	51 56 59	50 12 51
	Venus	E.	68 52 40	67 18 35	65 44 23	64 10 3
	Sun	E.	106 10 12	104 33 54	102 57 28	101 20 52
5	Aldebaran	W.	92 8 39	93 52 35	95 36 38	97 20 49
	Pollux	W.	50 5 26	51 49 37	53 33 59	55 18 32
	Spica	E.	41 30 11	39 45 16	38 0 14	36 15 7
	Venus	E.	56 16 31	54 41 28	53 6 19	51 31 5
	Sun	E.	93 15 35	91 38 5	90 0 27	88 22 39
6	Pollux	W.	64 3 54	65 49 27	67 35 9	69 20 59
	Jupiter	W.	28 2 9	29 47 25	31 32 54	33 18 36
	Regulus	W.	27 2 7	28 47 38	30 33 22	32 19 18
	Venus	E.	43 33 48	41 58 11	40 22 33	38 46 54
	Sun	E.	80 11 38	78 33 2	76 54 18	75 15 28
7	Pollux	W.	78 12 4	79 58 37	81 45 16	83 32 1
	Jupiter	W.	42 9 40	43 56 19	45 43 6	47 29 59
	Regulus	W.	41 11 26	42 58 16	44 45 14	46 32 18
	Saturn	W.	30 6 11	31 51 30	33 37 4	35 22 51
	Sun	E.	66 59 35	65 20 6	63 40 31	62 0 52
8	Pollux	W.	92 26 51	94 13 59	96 1 9	97 48 21
	Jupiter	W.	56 25 52	58 13 15	60 0 42	61 48 12
	Regulus	W.	55 29 0	57 16 32	59 4 8	60 51 46
	Saturn	W.	44 14 28	46 1 11	47 48 1	49 34 55
	Sun	E.	53 41 38	52 1 38	50 21 37	48 41 34
9	Jupiter	W.	70 46 1	72 33 35	74 21 7	76 8 37
	Regulus	W.	69 50 14	71 37 54	73 25 34	75 13 11
	Saturn	W.	58 30 9	60 17 15	62 4 21	63 51 26
	Sun	E.	40 21 19	38 41 21	37 1 26	35 21 35

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	α Arietis	W.	76 52 18	78 32 46	80 13 25	81 54 13
	Aldebaran	W.	44 49 57	46 28 17	48 6 55	49 45 50
	Jupiter	E.	34 26 5	32 46 10	31 6 9	29 26 3
	Regulus	E.	35 29 34	33 49 15	32 8 49	30 28 16
	Saturn	E.	46 50 49	45 11 3	43 31 10	41 51 10
	Spica	E.	89 29 41	87 48 59	86 8 6	84 27 3
2	α Arietis	W.	90 20 49	92 2 39	93 44 38	95 26 46
	Aldebaran	W.	58 4 18	59 44 42	61 25 20	63 6 11
	Saturn	E.	33 29 53	31 49 27	30 9 2	28 28 37
	Spica	E.	75 59 22	74 17 20	72 35 9	70 52 49
	Venus	E.	87 30 26	85 58 7	84 25 39	82 53 1
	Sun	E.	125 12 59	123 38 40	122 4 12	120 29 33
3	α Arietis	W.	103 59 46	105 42 50	107 26 4	109 9 27
	Aldebaran	W.	71 33 26	73 15 27	74 57 39	76 40 1
	Spica	E.	62 18 46	60 35 30	58 52 5	57 8 31
	Venus	E.	75 7 36	73 34 5	72 0 25	70 26 37
	Sun	E.	112 33 45	110 58 7	109 22 19	107 46 21
4	Aldebaran	W.	85 14 23	86 57 43	88 41 13	90 24 52
	Pollux	W.	43 10 51	44 54 10	46 37 43	48 21 29
	Spica	E.	48 28 34	46 44 10	44 59 38	43 14 59
	Venus	E.	62 35 34	61 0 59	59 26 15	57 51 27
	Sun	E.	99 44 7	98 7 13	96 30 10	94 52 57
5	Aldebaran	W.	99 5 8	100 49 34	102 34 7	104 18 47
	Pollux	W.	57 3 15	58 48 10	60 33 15	62 18 30
	Spica	E.	34 29 53	32 44 34	30 59 9	29 13 41
	Venus	E.	49 55 47	48 20 23	46 44 55	45 9 23
	Sun	E.	86 44 44	85 6 40	83 28 26	81 50 6
6	Pollux	W.	71 6 57	72 53 3	74 39 16	76 25 37
	Jupiter	W.	35 4 29	36 50 33	38 36 46	40 23 9
	Regulus	W.	34 5 25	35 51 42	37 38 8	39 24 43
	Venus	E.	37 11 16	35 35 40	34 0 8	32 24 41
	Sun	E.	73 36 30	71 57 26	70 18 15	68 38 58
7	Pollux	W.	85 18 51	87 5 45	88 52 44	90 39 46
	Jupiter	W.	49 16 59	51 4 4	52 51 16	54 38 32
	Regulus	W.	48 19 28	50 6 43	51 54 4	53 41 30
	Saturn	W.	37 8 50	38 55 1	40 41 22	42 27 51
	Sun	E.	60 21 9	58 41 22	57 1 30	55 21 36
8	Pollux	W.	99 35 34	101 22 47	103 10 0	104 57 12
	Jupiter	W.	63 35 44	65 23 16	67 10 51	68 58 26
	Regulus	W.	62 39 26	64 27 7	66 14 50	68 2 31
	Saturn	W.	51 21 52	53 8 53	54 55 57	56 43 2
	Sun	E.	47 1 30	45 21 26	43 41 22	42 1 20
9	Jupiter	W.	77 56 5	79 43 29	81 30 49	83 18 5
	Regulus	W.	77 0 45	78 48 15	80 35 42	82 23 3
	Saturn	W.	65 38 29	67 25 29	69 12 26	70 59 19
	Sun	E.	33 41 48	32 2 7	30 22 33	28 43 7

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	III^h.	VI^h.	IX^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
14	Sun	W.	24 40 21	26 11 29	27 42 19	29 12 54
	Mars	E.	58 0 32	56 26 47	54 53 23	53 20 21
	α Pegasi	E.	65 50 30	64 15 17	62 40 30	61 6 9
	α Arietis	E.	108 3 55	106 24 59	104 46 23	103 8 6
15	Sun	W.	36 41 12	38 9 56	39 38 22	41 6 29
	Mars	E.	45 40 37	44 9 47	42 39 17	41 9 11
	α Pegasi	E.	53 21 33	51 50 9	50 19 17	48 48 59
	α Arietis	E.	95 1 45	93 25 29	91 49 32	90 13 55
16	Sun	W.	48 22 26	49 48 44	51 14 45	52 40 29
	Mars	E.	33 44 13	32 16 22	30 48 53	29 21 50
	α Pegasi	E.	41 26 39	40 0 13	38 34 33	37 9 41
	α Arietis	E.	82 20 35	80 46 50	79 13 23	77 40 14
17	Sun	W.	59 45 6	61 9 16	62 33 11	63 56 53
	α Arietis	E.	69 58 42	68 27 12	66 55 55	65 24 54
	Aldebaran	E.	102 29 39	100 58 59	99 28 33	97 58 20
18	Sun	W.	70 52 15	72 14 46	73 37 7	74 59 18
	α Aquilæ	W.	44 5 25	45 11 31	46 18 35	47 26 29
	α Arietis	E.	57 53 4	56 23 19	54 53 45	53 24 21
	Aldebaran	E.	90 30 17	89 1 14	87 32 22	86 3 39
19	Sun	W.	81 48 8	83 9 33	84 30 53	85 52 9
	α Aquilæ	W.	53 16 44	54 28 34	55 40 53	56 53 39
	α Arietis	E.	45 59 48	44 31 19	43 2 58	41 34 44
	Aldebaran	E.	78 42 10	77 14 15	75 46 25	74 18 42
20	Sun	W.	92 37 38	93 58 38	95 19 37	96 40 36
	α Aquilæ	W.	63 3 29	64 18 29	65 33 47	66 49 22
	Fomalhaut	W.	38 59 57	40 7 32	41 16 12	42 25 54
	α Arietis	E.	34 15 11	32 47 35	31 20 5	29 52 40
	Aldebaran	E.	67 1 15	65 33 56	64 6 40	62 39 25
21	Sun	W.	103 25 55	104 47 8	106 8 25	107 29 46
	α Aquilæ	W.	73 11 13	74 28 18	75 45 36	77 3 6
	Fomalhaut	W.	48 27 19	49 41 48	50 56 54	52 12 36
	Mars	W.	23 52 26	25 14 23	26 36 33	27 58 56
	Aldebaran	E.	55 23 32	53 56 22	52 29 12	51 2 3
	Pollux	E.	97 11 58	95 43 40	94 15 18	92 46 51
22	Sun	W.	114 18 7	115 40 9	117 2 20	118 24 41
	α Aquilæ	W.	83 33 40	84 52 21	86 11 12	87 30 13
	Fomalhaut	W.	58 39 3	59 57 46	61 16 56	62 36 31
	Mars	W.	34 53 58	36 17 36	37 41 27	39 5 31
	Aldebaran	E.	43 46 2	42 18 50	40 51 37	39 24 23
	Pollux	E.	85 23 1	83 53 53	82 24 37	80 55 12
23	Sun	W.	125 18 59	126 42 25	128 6 3	129 29 55
	Fomalhaut	W.	69 20 17	70 42 9	72 4 22	73 26 56
	α Pegasi	W.	46 53 51	48 19 15	49 45 5	51 11 21
	Mars	W.	46 8 59	47 34 21	48 59 57	50 25 46
	Pollux	E.	73 25 38	71 55 10	70 24 31	68 53 40
	Jupiter	E.	109 13 31	107 42 23	106 11 1	104 39 26

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
14	Sun	W.	30 43 11	32 13 9	33 42 48	35 12 9
	Mars	E.	51 47 40	50 15 22	48 43 25	47 11 50
	a Pegasi	E.	59 32 15	57 58 50	56 25 54	54 53 28
	a Arietis	E.	101 30 10	99 52 34	98 15 18	96 38 21
15	Sun	W.	42 34 17	44 1 46	45 28 57	46 55 50
	Mars	E.	39 39 26	38 10 5	36 41 5	35 12 27
	a Pegasi	E.	47 19 16	45 50 9	44 21 39	42 53 49
	a Arietis	E.	88 38 37	87 3 39	85 28 59	83 54 38
16	Sun	W.	54 5 56	55 31 6	56 56 1	58 20 41
	Mars	E.	27 55 9	26 28 55	25 3 8	23 37 46
	a Pegasi	E.	35 45 40	34 22 36	33 0 32	31 39 34
	a Arietis	E.	76 7 23	74 34 49	73 2 31	71 30 28
17	Sun	W.	65 20 22	66 43 38	68 6 42	69 29 34
	a Arietis	E.	63 54 5	62 23 31	60 53 9	59 23 1
	Aldebaran	E.	96 28 19	94 58 31	93 28 56	91 59 31
18	Sun	W.	76 21 19	77 43 12	79 4 58	80 26 36
	a Aquilæ	W.	48 35 11	49 44 37	50 54 42	52 5 26
	a Arietis	E.	51 55 8	50 26 5	48 57 11	47 28 25
	Aldebaran	E.	84 35 4	83 6 39	81 38 21	80 10 13
19	Sun	W.	87 13 21	88 34 29	89 55 34	91 16 37
	a Aquilæ	W.	58 6 51	59 20 28	60 34 27	61 48 48
	a Arietis	E.	40 6 36	38 38 35	37 10 40	35 42 52
	Aldebaran	E.	72 51 3	71 23 30	69 56 1	68 28 37
20	Sun	W.	98 1 36	99 22 37	100 43 40	102 4 46
	a Aquilæ	W.	68 5 14	69 21 22	70 37 45	71 54 22
	Fomalhaut	W.	43 36 33	44 48 5	46 0 25	47 13 31
	a Arietis	E.	28 25 21	26 58 9	25 31 3	24 4 3
	Aldebaran	E.	61 12 13	59 45 1	58 17 51	56 50 41
21	Sun	W.	108 51 12	110 12 46	111 34 26	112 56 13
	a Aquilæ	W.	78 20 49	79 38 44	80 56 51	82 15 10
	Fomalhaut	W.	53 28 52	54 45 40	56 2 59	57 20 47
	Mars	W.	29 21 31	30 44 19	32 7 19	33 30 32
	Aldebaran	E.	49 34 52	48 7 41	46 40 28	45 13 16
	Pollux	E.	91 18 18	89 49 39	88 20 53	86 52 1
22	Sun	W.	119 47 11	121 9 51	122 32 43	123 55 45
	a Aquilæ	W.	88 49 24	90 8 45	91 28 15	92 47 55
	Fomalhaut	W.	63 56 30	65 16 53	66 37 39	67 58 48
	Mars	W.	40 29 47	41 54 15	43 18 56	44 43 51
	Aldebaran	E.	37 57 12	36 30 4	35 2 59	33 36 0
	Pollux	E.	79 25 38	77 55 53	76 25 59	74 55 54
23	Sun	W.	130 54 0	132 18 18	133 42 51	135 7 38
	Fomalhaut	W.	74 49 49	76 13 2	77 36 35	79 0 26
	a Pegasi	W.	52 38 3	54 5 10	55 32 42	57 0 38
	Mars	W.	51 51 51	53 18 11	54 44 46	56 11 36
	Pollux	E.	67 22 36	65 51 19	64 19 49	62 48 6
	Jupiter	E.	103 7 38	101 35 35	100 3 19	98 30 47

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Noon.	IIIh.	VIh.	IXh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
24	Fomalhaut	W.	80 24 36	81 49 4	83 13 51	84 38 53
	α Pegasi	W.	58 28 55	59 57 37	61 26 41	62 56 7
	Mars	W.	57 38 42	59 6 4	60 33 41	62 1 36
	Pollux	E.	61 16 10	59 44 0	58 11 36	56 38 58
	Jupiter	E.	96 58 1	95 24 59	93 51 42	92 18 8
	Regulus	E.	98 6 25	96 33 37	95 0 34	93 27 16
25	Fomalhaut	W.	70 28 41	72 0 15	73 32 8	75 4 22
	Mars	W.	69 25 20	70 54 57	72 24 50	73 55 3
	α Arietis	W.	26 59 6	28 32 40	30 6 39	31 41 4
	Pollux	E.	48 52 18	47 18 17	45 44 3	44 9 35
	Jupiter	E.	84 26 13	82 51 0	81 15 30	79 39 42
	Regulus	E.	85 36 42	84 1 44	82 26 29	80 50 58
26	α Pegasi	W.	82 50 23	84 24 32	85 58 59	87 33 43
	Mars	W.	81 30 26	83 2 24	84 34 39	86 7 13
	α Arietis	W.	39 38 50	41 15 29	42 52 27	44 29 47
	Pollux	E.	36 14 13	34 38 38	33 2 55	31 27 7
	Jupiter	E.	71 36 18	69 58 45	68 20 54	66 42 46
	Regulus	E.	72 48 59	71 11 42	69 34 9	67 56 19
	Saturn	E.	84 19 7	82 42 1	81 4 38	79 26 57
27	α Pegasi	W.	95 31 38	97 8 0	98 44 37	100 21 28
	Mars	W.	93 54 16	95 28 31	97 3 2	98 37 51
	α Arietis	W.	52 41 11	54 20 24	55 59 55	57 39 44
	Aldebaran	W.	21 42 57	23 13 37	24 45 38	26 18 50
	Jupiter	E.	58 27 52	56 48 4	55 8 0	53 27 40
	Regulus	E.	59 42 53	58 3 22	56 23 35	54 43 32
	Saturn	E.	71 14 22	69 35 1	67 55 25	66 15 33
28	Mars	W.	106 35 41	108 11 59	109 48 31	111 25 16
	α Arietis	W.	66 2 55	67 44 21	69 26 1	71 7 56
	Aldebaran	W.	34 17 57	35 55 49	37 34 13	39 13 6
	Jupiter	E.	45 2 19	43 20 34	41 38 36	39 56 26
	Regulus	E.	46 19 36	44 38 7	42 56 25	41 14 31
	Saturn	E.	57 52 31	56 11 13	54 29 43	52 48 1
	Spica	E.	100 21 22	98 39 41	96 57 45	95 15 35
29	α Arietis	W.	79 40 55	81 24 8	83 7 32	84 51 8
	Aldebaran	W.	47 33 50	49 15 3	50 56 34	52 38 22
	Jupiter	E.	31 23 5	29 40 0	27 56 51	26 13 39
	Regulus	E.	32 42 16	30 59 20	29 16 17	27 33 8
	Saturn	E.	44 16 50	42 34 9	40 51 21	39 8 27
	Spica	E.	86 41 29	84 58 3	83 14 26	81 30 39
30	α Arietis	W.	93 31 33	95 18 4	97 2 43	98 47 29
	Aldebaran	W.	61 11 1	62 54 11	64 37 32	66 21 3
	Saturn	E.	30 33 13	28 50 13	27 7 20	25 24 38
	Spica	E.	72 49 15	71 4 32	69 19 42	67 34 45
	Venus	E.	118 0 51	116 25 46	114 50 32	113 15 10
31	Aldebaran	W.	75 0 45	76 45 3	78 29 25	80 13 53
	Pollux	W.	33 1 49	34 45 21	36 29 8	38 13 8
	Spica	E.	58 48 28	57 2 58	55 17 24	53 31 47
	Venus	E.	105 16 30	103 40 27	102 4 20	100 28 8

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
24	Fomalhaut	W.	86 4 13	87 29 51	88 55 44	90 21 53
	α Pegasi	W.	64 25 56	65 56 6	67 26 37	68 57 28
	Mars	W.	63 29 47	64 58 15	66 26 59	67 56 1
	Pollux	E.	55 6 6	53 33 0	51 59 40	50 26 6
	Jupiter	E.	90 44 19	89 10 13	87 35 50	86 1 10
	Regulus	E.	91 53 42	90 19 52	88 45 45	87 11 22
25	α Pegasi	W.	76 36 55	78 9 48	79 43 1	81 16 35
	Mars	W.	75 25 31	76 56 19	78 27 23	79 58 46
	α Arietis	W.	33 15 52	34 51 4	36 26 37	38 2 34
	Pollux	E.	42 34 54	41 0 0	39 24 55	37 49 39
	Jupiter	E.	78 3 36	76 27 12	74 50 31	73 13 33
	Regulus	E.	79 15 9	77 39 2	76 2 38	74 25 57
26	α Pegasi	W.	89 8 45	90 44 4	92 19 39	93 55 31
	Mars	W.	87 40 3	89 13 11	90 46 35	92 20 18
	α Arietis	W.	46 7 25	47 45 23	49 23 40	51 2 17
	Pollux	E.	29 51 14	28 15 19	26 39 26	25 3 39
	Jupiter	E.	65 4 21	63 25 39	61 46 40	60 7 24
	Regulus	E.	66 18 12	64 39 47	63 1 5	61 22 7
	Saturn	E.	77 49 0	76 10 46	74 32 15	72 53 27
27	α Pegasi	W.	101 58 32	103 35 49	105 13 18	106 50 58
	Mars	W.	100 12 54	101 48 13	103 23 48	104 59 37
	α Arietis	W.	59 19 49	61 0 12	62 40 50	64 21 45
	Aldebaran	W.	27 53 2	29 28 9	31 4 4	32 40 41
	Jupiter	E.	51 47 5	50 6 15	48 25 10	46 43 51
	Regulus	E.	53 3 15	51 22 42	49 41 54	48 0 51
	Saturn	E.	64 35 26	62 55 4	61 14 27	59 33 36
28	Mars	W.	113 2 14	114 39 25	116 16 47	117 54 21
	α Arietis	W.	72 50 5	74 32 29	76 15 4	77 57 53
	Aldebaran	W.	40 52 28	42 32 15	44 12 25	45 52 57
	Jupiter	E.	38 14 5	36 31 34	34 48 52	33 6 3
	Regulus	E.	39 32 25	37 50 7	36 7 39	34 25 1
	Saturn	E.	51 6 7	49 24 2	47 41 47	45 59 23
	Spica	E.	93 33 11	91 50 34	90 7 45	88 24 43
29	α Arietis	W.	86 34 54	88 18 50	90 2 55	91 47 10
	Aldebaran	W.	54 20 25	56 2 44	57 45 17	59 28 3
	Jupiter	E.	24 30 26	22 47 13	21 4 4	19 21 4
	Regulus	E.	25 49 54	24 6 39	22 23 27	20 40 21
	Saturn	E.	37 25 29	35 42 26	33 59 22	32 16 17
	Spica	E.	79 46 41	78 2 33	76 18 16	74 33 50
30	α Arietis	W.	100 30 22	102 15 21	104 0 25	105 45 35
	Aldebaran	W.	68 4 44	69 48 33	71 32 30	73 16 34
	Saturn	E.	23 42 9	21 59 59	20 18 17	18 37 12
	Spica	E.	65 49 41	64 4 31	62 19 15	60 33 54
	Venus	E.	111 39 40	110 4 3	108 28 18	106 52 27
31	Aldebaran	W.	81 58 27	83 43 5	85 27 45	87 12 27
	Pollux	W.	39 57 21	41 41 44	43 26 17	45 10 58
	Spica	E.	51 46 7	50 0 24	48 14 39	46 28 52
	Venus	E.	98 51 52	97 15 31	95 39 7	94 2 41

JANUARY, 1860.

MEAN TIME.

Day of the Month.	Geocentric Apparent Declination. Noon. °	′	″	Meridian Passage. h.	m.
1	S. 14	26	33	19	55·6
2	14	38	13	19	54·1
3	14	49	47	19	52·6
4	15	1	14	19	51·1
5	15	12	36	19	49·6
6	15	23	51	19	48·1
7	15	35	0	19	46·6
8	15	46	2	19	45·1
9	15	56	58	19	43·6
10	16	7	48	19	42·1
11	16	18	31	19	40·6
12	16	29	7	19	39·1
13	16	39	37	19	37·6
14	16	49	59	19	36·1
15	17	0	15	19	34·7
16	17	10	24	19	33·2
17	17	20	25	19	31·7
18	17	30	20	19	30·2
19	17	40	7	19	28·8
20	17	49	47	19	27·3
21	17	59	20	19	25·9
22	18	8	45	19	24·4
23	18	18	3	19	22·9
24	18	27	13	19	21·5
25	18	36	16	19	20·0
26	18	45	11	19	18·6
27	18	53	58	19	17·1
28	19	2	38	19	15·7
29	19	11	10	19	14·2
30	19	19	34	19	12·8
31	19	27	50	19	11·3
32	S. 19	35	59	19	9·9

FEBRUARY, 1860.

MEAN TIME.

Day of the Month.	Geocentric Apparent Declination. Noon. °	′	″	Meridian Passage. h.	m.
1	S. 19	35	59	19	9·9
2	19	43	59	19	8·5
3	19	51	52	19	7·0
4	19	59	36	19	5·6
5	20	7	13	19	4·1
6	20	14	41	19	2·7
7	20	22	2	19	1·3
8	20	29	14	18	59·8
9	20	36	18	18	58·4
10	20	43	14	18	57·0
11	20	50	2	18	55·5
12	20	56	41	18	54·1
13	21	3	12	18	52·6
14	21	9	35	18	51·2
15	21	15	49	18	49·8
16	21	21	56	18	48·3
17	21	27	54	18	46·9
18	21	33	43	18	45·5
19	21	39	25	18	44·0
20	21	44	58	18	42·6
21	21	50	22	18	41·2
22	21	55	38	18	39·7
23	22	0	46	18	38·3
24	22	5	45	18	36·9
25	22	10	37	18	35·4
26	22	15	20	18	34·0
27	22	19	54	18	32·5
28	22	24	21	18	31·1
29	22	28	40	18	29·6
30	22	32	50	18	28·1
31	22	36	52	18	26·6
32	S. 22	40	46	18	25·2

MARCH, 1860.						APRIL, 1860.					
MEAN TIME.						MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.		Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.		°	′	″	h.	m.
1	S. 22	32	50	18	28·1	1	S. 23	39	16	17	40·3
2	22	36	52	18	26·6	2	23	39	38	17	38·6
3	22	40	46	18	25·2	3	23	39	54	17	36·9
4	22	44	32	18	23·7	4	23	40	6	17	35·2
5	22	48	9	18	22·2	5	23	40	12	17	33·5
6	22	51	39	18	20·8	6	23	40	13	17	31·8
7	22	55	1	18	19·3	7	23	40	9	17	30·1
8	22	58	15	18	17·8	8	23	40	1	17	28·4
9	23	1	21	18	16·3	9	23	39	48	17	26·6
10	23	4	19	18	14·8	10	23	39	31	17	24·8
11	23	7	9	18	13·3	11	23	39	9	17	23·1
12	23	9	52	18	11·8	12	23	38	44	17	21·3
13	23	12	27	18	10·3	13	23	38	15	17	19·5
14	23	14	55	18	8·8	14	23	37	43	17	17·7
15	23	17	14	18	7·3	15	23	37	7	17	15·8
16	23	19	27	18	5·8	16	23	36	28	17	14·0
17	23	21	32	18	4·2	17	23	35	46	17	12·1
18	23	23	30	18	2·7	18	23	35	1	17	10·2
19	23	25	21	18	1·1	19	23	34	14	17	8·3
20	23	27	4	17	59·6	20	23	33	25	17	6·4
21	23	28	41	17	58·0	21	23	32	34	17	4·5
22	23	30	11	17	56·5	22	23	31	41	17	2·5
23	23	31	34	17	54·9	23	23	30	46	17	0·5
24	23	32	50	17	53·3	24	23	29	50	16	58·5
25	23	34	0	17	51·7	25	23	28	53	16	56·5
26	23	35	4	17	50·1	26	23	27	55	16	54·5
27	23	36	1	17	48·5	27	23	26	57	16	52·5
28	23	36	52	17	46·9	28	23	25	58	16	50·4
29	23	37	37	17	45·2	29	23	24	59	16	48·3
30	23	38	16	17	43·6	30	23	24	0	16	46·2
31	23	38	49	17	41·9	31	23	23	1	16	44·1
32	S. 23	39	16	17	40·3	32	S. 23	22	3	16	41·9

MAY, 1860.							JUNE, 1860.						
MEAN TIME.							MEAN TIME.						
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.			Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.		
	°	′	″	h.	m.			°	′	″	h.	m.	
1	S. 23	23	1	16	44·1		1	S. 23	22	10	15	23·9	
2	23	22	3	16	41·9		2	23	23	58	15	20·7	
3	23	21	6	16	39·7		3	23	25	55	15	17·5	
4	23	20	10	16	37·5		4	23	28	2	15	14·2	
5	23	19	15	16	35·3		5	23	30	19	15	11·0	
6	23	18	22	16	33·1		6	23	32	46	15	7·6	
7	23	17	31	16	30·8		7	23	35	23	15	4·2	
8	23	16	42	16	28·5		8	23	38	11	15	0·8	
9	23	15	56	16	26·1		9	23	41	9	14	57·3	
10	23	15	13	16	23·8		10	23	44	19	14	53·8	
11	23	14	33	16	21·4		11	23	47	40	14	50·2	
12	23	13	56	16	19·0		12	23	51	12	14	46·6	
13	23	13	23	16	16·6		13	23	54	55	14	42·9	
14	23	12	55	16	14·1		14	23	58	50	14	39·2	
15	23	12	31	16	11·6		15	24	2	55	14	35·4	
16	23	12	12	16	9·1		16	24	7	12	14	31·5	
17	23	11	58	16	6·5		17	24	11	39	14	27·6	
18	23	11	49	16	3·9		18	24	16	16	14	23·7	
19	23	11	46	16	1·3		19	24	21	4	14	19·7	
20	23	11	50	15	58·6		20	24	26	2	14	15·6	
21	23	12	0	15	55·9		21	24	31	9	14	11·5	
22	23	12	16	15	53·2		22	24	36	25	14	7·3	
23	23	12	40	15	50·4		23	24	41	51	14	3·1	
24	23	13	11	15	47·6		24	24	47	24	13	58·8	
25	23	13	50	15	44·8		25	24	53	6	13	54·5	
26	23	14	36	15	41·9		26	24	58	54	13	50·1	
27	23	15	30	15	39·0		27	25	4	49	13	45·7	
28	23	16	32	15	36·1		28	25	10	50	13	41·2	
29	23	17	43	15	33·1		29	25	16	57	13	36·7	
30	23	19	3	15	30·0		30	25	23	8	13	32·1	
31	23	20	32	15	27·0								
							31	25	29	23	13	27·5	
32	S. 23	22	10	15	23·9		32	S. 25	35	41	13	22·8	

JULY, 1860.						AUGUST, 1860.					
MEAN TIME.						MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.		Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.		°	′	″	h.	m.
1	S. 25	29	23	13	27·5	1	S. 28	0	47	10	52·7
2	25	35	41	13	22·8	2	28	2	16	10	47·9
3	25	42	2	13	18·1	3	28	3	29	10	43·1
4	25	48	24	13	13·3	4	28	4	26	10	38·4
5	25	54	48	13	8·6	5	28	5	8	10	33·7
6	26	1	11	13	3·7	6	28	5	34	10	29·0
7	26	7	33	12	58·8	7	28	5	44	10	24·4
8	26	13	54	12	53·9	8	28	5	40	10	19·9
9	26	20	12	12	49·0	9	28	5	20	10	15·4
10	26	26	27	12	44·0	10	28	4	46	10	10·9
11	26	32	38	12	39·0	11	28	3	58	10	6·6
12	26	38	43	12	33·9	12	28	2	55	10	2·2
13	26	44	42	12	28·9	13	28	1	39	9	57·9
14	26	50	33	12	23·8	14	28	0	9	9	53·6
15	26	56	16	12	18·7	15	27	58	25	9	49·5
16	27	1	50	12	13·6	16	27	56	29	9	45·4
17	27	7	14	12	8·5	17	27	54	20	9	41·4
18	27	12	27	12	3·3	18	27	51	59	9	37·4
19	27	17	28	11	58·2	19	27	49	26	9	33·4
20	27	22	16	11	53·1	20	27	46	40	9	29·6
21	27	26	52	11	47·9	21	27	43	43	9	25·9
22	27	31	14	11	42·8	22	27	40	35	9	22·1
23	27	35	21	11	37·7	23	27	37	16	9	18·4
24	27	39	14	11	32·6	24	27	33	46	9	14·9
25	27	42	51	11	27·5	25	27	30	6	9	11·3
26	27	46	13	11	22·4	26	27	26	16	9	7·8
27	27	49	19	11	17·4	27	27	22	16	9	4·3
28	27	52	9	11	12·4	28	27	18	6	9	1·0
29	27	54	43	11	7·4	29	27	13	46	8	57·7
30	27	57	0	11	2·5	30	27	99	17	8	54·5
31	27	59	2	10	57·6	31	27	4	40	8	51·3
32	S. 28	0	47	10	52·7	32	S. 26	59	53	8	48·1

SEPTEMBER, 1860.

MEAN TIME.

Day of the Month.	GEOCENTRIC. Apparent Declination. Noon. °	′	″	Meridian Passage. h.	m.
1	S. 26	59	53	8	48·1
2	26	54	58	8	44·9
3	26	49	54	8	41·9
4	26	44	41	8	38·9
5	26	39	20	8	36·0
6	26	33	49	8	33·0
7	26	28	10	8	30·2
8	26	22	23	8	27·3
9	26	16	28	8	24·5
10	26	10	24	8	21·8
11	26	4	12	8	19·0
12	25	57	52	8	16·5
13	25	51	22	8	13·9
14	25	44	44	8	11·3
15	25	37	58	8	8·8
16	25	31	3	8	6·3
17	25	24	0	8	3·9
18	25	16	47	8	1·5
19	25	9	26	7	59·1
20	25	1	57	7	56·7
21	24	54	19	7	54·4
22	24	46	33	7	52·2
23	24	38	38	7	50·0
24	24	30	35	7	47·8
25	24	22	23	7	45·6
26	24	14	2	7	43·4
27	24	5	33	7	41·2
28	23	56	55	7	39·1
29	23	48	9	7	37·1
30	23	39	14	7	35·1
31	23	30	10	7	33·1
32	S. 23	20	58	7	31·1

OCTOBER, 1860.

MEAN TIME.

Day of the Month.	GEOCENTRIC. Apparent Declination. Noon. °	′	″	Meridian Passage. h.	m.
1	S. 23	30	10	7	33·1
2	23	20	58	7	31·1
3	23	11	38	7	29·1
4	23	2	9	7	27·2
5	22	52	31	7	25·3
6	22	42	46	7	23·3
7	22	32	51	7	21·4
8	22	22	48	7	19·5
9	22	12	36	7	17·7
10	22	2	16	7	15·9
11	21	51	46	7	14·1
12	21	41	8	7	12·3
13	21	30	21	7	10·5
14	21	19	25	7	8·7
15	21	8	21	7	7·0
16	20	57	7	7	5·2
17	20	45	45	7	3·5
18	20	34	14	7	1·8
19	20	22	35	7	0·1
20	20	10	48	6	58·3
21	19	58	52	6	56·6
22	19	46	47	6	55·0
23	19	34	35	6	53·3
24	19	22	14	6	51·7
25	19	9	46	6	50·0
26	18	57	9	6	48·4
27	18	44	24	6	46·8
28	18	31	32	6	45·2
29	18	18	32	6	43·6
30	18	5	24	6	42·0
31	17	52	8	6	40·4
32	S. 17	38	44	6	38·8

NOVEMBER, 1860.							DECEMBER, 1860.						
MEAN TIME.							MEAN TIME.						
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			GEOCENTRIC. Meridian Passage.			Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			GEOCENTRIC. Meridian Passage.		
	°	′	″	h.	m.			°	′	″	h.	m.	
1	S. 17	38	44	6	38·8		1	S. 10	5	35	5	53·1	
2	17	25	13	6	37·2		2	9	49	6	5	51·6	
3	17	11	34	6	35·6		3	9	32	32	5	50·2	
4	16	57	48	6	34·0		4	9	15	55	5	48·7	
5	16	43	54	6	32·5		5	8	59	14	5	47·2	
6	16	29	53	6	31·0		6	8	42	29	5	45·8	
7	16	15	44	6	29·4		7	8	25	41	5	44·3	
8	16	1	29	6	27·8		8	8	8	49	5	42·8	
9	15	47	7	6	26·3		9	7	51	55	5	41·3	
10	15	32	38	6	24·7		10	7	34	57	5	39·8	
11	15	18	2	6	23·2		11	7	17	56	5	38·4	
12	15	3	20	6	21·7		12	7	0	52	5	36·9	
13	14	48	31	6	20·2		13	6	43	45	5	35·4	
14	14	33	36	6	18·7		14	6	26	35	5	33·9	
15	14	18	35	6	17·1		15	6	9	24	5	32·4	
16	14	3	27	6	15·6		16	5	52	10	5	30·9	
17	13	48	14	6	14·1		17	5	34	53	5	29·5	
18	13	32	54	6	12·6		18	5	17	35	5	28·0	
19	13	17	29	6	11·1		19	5	0	15	5	26·5	
20	13	1	58	6	9·6		20	4	42	53	5	25·0	
21	12	46	22	6	8·1		21	4	25	30	5	23·5	
22	12	30	40	6	6·6		22	4	8	5	5	22·0	
23	12	14	52	6	5·0		23	3	50	39	5	20·6	
24	11	59	0	6	3·6		24	3	33	12	5	19·1	
25	11	43	2	6	2·1		25	3	15	44	5	17·6	
26	11	26	59	6	0·6		26	2	58	16	5	16·2	
27	11	10	51	5	59·1		27	2	40	46	5	14·7	
28	10	54	39	5	57·6		28	2	23	16	5	13·2	
29	10	38	22	5	56·1		29	2	5	45	5	11·8	
30	10	22	1	5	54·6		30	1	48	14	5	10·3	
							31	1	30	42	5	8·8	
31	10	5	35	5	53·1								
32	S. 9	49	6	5	51·6		32	S. 1	13	11	5	7·3	

JANUARY, 1860.						FEBRUARY, 1860.					
MEAN TIME.						MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			GEOCENTRIC. Meridian Passage.		Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			GEOCENTRIC. Meridian Passage.	
	°	′	″	h.	m.		°	′	″	h.	m.
1	N.22	1	35	12	49·3	1	N.22	39	58	10	30·5
2	22	2	57	12	44·9	2	22	40	56	10	26·1
3	22	4	20	12	40·4	3	22	41	52	10	21·7
4	22	5	42	12	35·9	4	22	42	47	10	17·3
5	22	7	5	12	31·4	5	22	43	40	10	12·9
6	22	8	27	12	26·9	6	22	44	32	10	8·5
7	22	9	49	12	22·5	7	22	45	23	10	4·2
8	22	11	11	12	17·9	8	22	46	12	9	59·9
9	22	12	32	12	13·4	9	22	47	0	9	55·6
10	22	13	53	12	8·9	10	22	47	46	9	51·3
11	22	15	13	12	4·4	11	22	48	31	9	47·0
12	22	16	33	11	59·9	12	22	49	14	9	42·7
13	22	17	52	11	55·4	13	22	49	56	9	38·4
14	22	19	11	11	50·9	14	22	50	37	9	34·1
15	22	20	28	11	46·4	15	22	51	16	9	29·8
16	22	21	45	11	41·9	16	22	51	53	9	25·5
17	22	23	2	11	37·4	17	22	52	29	9	21·3
18	22	24	17	11	32·9	18	22	53	4	9	17·1
19	22	25	31	11	28·4	19	22	53	37	9	12·9
20	22	26	45	11	23·9	20	22	54	8	9	8·7
21	22	27	57	11	19·4	21	22	54	38	9	4·5
22	22	29	9	11	14·9	22	22	55	7	9	0·3
23	22	30	19	11	10·4	23	22	55	34	8	56·1
24	22	31	28	11	6·0	24	22	56	0	8	51·9
25	22	32	36	11	1·5	25	22	56	24	8	47·8
26	22	33	43	10	57·0	26	22	56	46	8	43·7
27	22	34	49	10	52·5	27	22	57	8	8	39·6
28	22	35	53	10	48·1	28	22	57	27	8	35·5
29	22	36	57	10	43·7	29	22	57	46	8	31·4
30	22	37	58	10	39·3	30	22	58	3	8	27·3
31	22	38	59	10	34·9	31	22	58	18	8	23·2
32	N.22	39	58	10	30·5	32	N.22	58	32	8	19·2

MARCH, 1860.						APRIL, 1860.					
MEAN TIME.						MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.		Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.		°	′	″	h.	m.
1	N. 22	58	3	8	27·3	1	N. 22	55	16	6	28·1
2	22	58	18	8	23·2	2	22	54	49	6	24·5
3	22	58	32	8	19·2	3	22	54	20	6	20·9
4	22	58	44	8	15·2	4	22	53	50	6	17·3
5	22	58	55	8	11·2	5	22	53	19	6	13·7
6	22	59	5	8	7·2	6	22	52	46	6	10·1
7	22	59	13	8	3·2	7	22	52	12	6	6·5
8	22	59	20	7	59·2	8	22	51	37	6	2·9
9	22	59	26	7	55·2	9	22	51	0	5	59·3
10	22	59	30	7	51·3	10	22	50	22	5	55·8
11	22	59	33	7	47·4	11	22	49	42	5	52·3
12	22	59	35	7	43·5	12	22	49	1	5	48·8
13	22	59	35	7	39·6	13	22	48	19	5	45·3
14	22	59	33	7	35·7	14	22	47	35	5	41·8
15	22	59	31	7	31·8	15	22	46	50	5	38·3
16	22	59	27	7	27·9	16	22	46	3	5	34·8
17	22	59	21	7	24·1	17	22	45	15	5	31·3
18	22	59	14	7	20·3	18	22	44	26	5	27·8
19	22	59	6	7	16·5	19	22	43	35	5	24·3
20	22	58	57	7	12·7	20	22	42	42	5	20·9
21	22	58	46	7	8·9	21	22	41	49	5	17·5
22	22	58	34	7	5·1	22	22	40	53	5	14·1
23	22	58	20	7	1·3	23	22	39	56	5	10·7
24	22	58	5	6	57·6	24	22	38	58	5	7·3
25	22	57	49	6	53·9	25	22	37	59	5	3·9
26	22	57	31	6	50·2	26	22	36	57	5	0·5
27	22	57	12	6	46·5	27	22	35	55	4	57·1
28	22	56	52	6	42·8	28	22	34	51	4	53·7
29	22	56	30	6	39·1	29	22	33	45	4	50·4
30	22	56	7	6	35·4	30	22	32	38	4	47·0
31	22	55	42	6	31·7						
						31	22	31	29	4	43·7
32	N. 22	55	16	6	28·1	32	N. 22	30	19	4	40·4

MAY, 1860.						JUNE, 1860.					
MEAN TIME.						MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.		Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.		°	′	″	h.	m.
1	N.22	31	29	4	43·7	1	N.21	43	22	3	3·8
2	22	30	19	4	40·4	2	21	41	24	3	0·7
3	22	29	8	4	37·1	3	21	39	24	2	57·5
4	22	27	55	4	33·8	4	21	37	23	2	54·4
5	22	26	40	4	30·5	5	21	35	20	2	51·3
6	22	25	24	4	27·2	6	21	33	16	2	48·2
7	22	24	6	4	23·9	7	21	31	10	2	45·1
8	22	22	47	4	20·6	8	21	29	3	2	42·0
9	22	21	26	4	17·3	9	21	26	54	2	38·9
10	22	20	4	4	14·0	10	21	24	43	2	35·8
11	22	18	41	4	10·7	11	21	22	31	2	32·7
12	22	17	15	4	7·5	12	21	20	18	2	29·6
13	22	15	49	4	4·3	13	21	18	2	2	26·5
14	22	14	20	4	1·1	14	21	15	46	2	23·4
15	22	12	50	3	57·9	15	21	13	28	2	20·3
16	22	11	19	3	54·7	16	21	11	8	2	17·3
17	22	9	46	3	51·5	17	21	8	47	2	14·2
18	22	8	11	3	48·3	18	21	6	24	2	11·2
19	22	6	35	3	45·1	19	21	4	0	2	8·1
20	22	4	57	3	41·9	20	21	1	34	2	5·0
21	22	3	18	3	38·7	21	20	59	7	2	2·0
22	22	1	37	3	35·5	22	20	56	38	1	58·9
23	21	59	55	3	32·3	23	20	54	8	1	55·9
24	21	58	11	3	29·1	24	20	51	36	1	52·8
25	21	56	25	3	25·9	25	20	49	3	1	49·7
26	21	54	38	3	22·7	26	20	46	29	1	46·7
27	21	52	49	3	19·5	27	20	43	53	1	43·6
28	21	50	59	3	16·3	28	20	41	16	1	40·6
29	21	49	7	3	13·2	29	20	38	37	1	37·5
30	21	47	14	3	10·1	30	20	35	57	1	34·5
31	21	45	19	3	7·0	31	20	33	16	1	31·4
32	N.21	43	22	3	3·8	32	N.20	30	33	1	28·4

JULY, 1860.						AUGUST, 1860.					
MEAN TIME.						MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.		Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.		°	′	″	h.	m.
1	N. 20	33	16	1	31·4	1	N. 18	59	42	23	54·5
2	20	30	33	1	28·4	2	18	56	25	23	51·4
3	20	27	49	1	25·3	3	18	53	6	23	48·4
4	20	25	4	1	22·3	4	18	49	47	23	45·4
5	20	22	17	1	19·2	5	18	46	27	23	42·3
6	20	19	29	1	16·2	6	18	43	6	23	39·3
7	20	16	39	1	13·2	7	18	39	44	23	36·3
8	20	13	49	1	10·1	8	18	36	22	23	33·2
9	20	10	57	1	7·1	9	18	32	59	23	30·2
10	20	8	3	1	4·1	10	18	29	35	23	27·2
11	20	5	9	1	1·1	11	18	26	11	23	24·1
12	20	2	13	0	58·0	12	18	22	46	23	21·1
13	19	59	16	0	55·0	13	18	19	20	23	18·0
14	19	56	18	0	52·0	14	18	15	54	23	15·0
15	19	53	18	0	49·0	15	18	12	28	23	11·9
16	19	50	17	0	45·9	16	18	9	1	23	8·9
17	19	47	16	0	42·9	17	18	5	33	23	5·8
18	19	44	13	0	39·9	18	18	2	5	23	2·8
19	19	41	8	0	36·9	19	17	58	37	22	59·7
20	19	38	3	0	33·8	20	17	55	8	22	56·7
21	19	34	57	0	30·8	21	17	51	39	22	53·6
22	19	31	50	0	27·8	22	17	48	9	22	50·6
23	19	28	41	0	24·8	23	17	44	40	22	47·5
24	19	25	32	0	21·7	24	17	41	10	22	44·4
25	19	22	22	0	18·7	25	17	37	40	22	41·3
26	19	19	10	0	15·7	26	17	34	9	22	38·2
27	19	15	58	0	12·6	27	17	30	39	22	35·1
28	19	12	44	0	9·6	28	17	27	8	22	32·1
29	19	9	30	0	6·6	29	17	23	37	22	29·0
30	19	6	15	0	3·5	30	17	20	7	22	25·9
31	19	2	59	{ 0 / 23	0·5 / 57·5 }	31	17	16	36	22	22·8
32	N. 18	59	42	23	54·5	32	N. 17	13	5	22	22·8

SEPTEMBER, 1860.						OCTOBER, 1860.					
MEAN TIME.						MEAN TIME.					
Day of the Month.	GEOCENTRIC.					Day of the Month.	GEOCENTRIC.				
	Apparent Declination. Noon.			Meridian Passage.			*Apparent* Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.		°	′	″	h.	m.
1	N.17	13	5	22	19·7	1	N.15	30	42	20	44·9
2	17	9	34	22	16·6	2	15	27	30	20	41·7
3	17	6	4	22	13·5	3	15	24	19	20	38·5
4	17	2	33	22	10·4	4	15	21	9	20	35·2
5	16	59	3	22	7·3	5	15	18	1	20	31·9
6	16	55	32	22	4·2	6	15	14	54	20	28·6
7	16	52	2	22	1·1	7	15	11	49	20	25·4
8	16	48	32	21	58·0	8	15	8	45	20	22·1
9	16	45	2	21	54·9	9	15	5	43	20	18·8
10	16	41	33	21	51·8	10	15	2	42	20	15·5
11	16	38	4	21	48·6	11	14	59	43	20	12·2
12	16	34	35	21	45·4	12	14	56	46	20	8·9
13	16	31	7	21	42·3	13	14	53	50	20	5·6
14	16	27	39	21	39·2	14	14	50	56	20	2·3
15	16	24	12	21	36·1	15	14	48	4	19	59·0
16	16	20	46	21	32·9	16	14	45	14	19	55·7
17	16	17	20	21	29·7	17	14	42	26	19	52·4
18	16	13	54	21	26·5	18	14	39	40	19	49·1
19	16	10	29	21	23·3	19	14	36	56	19	45·7
20	16	7	6	21	20·1	20	14	34	14	19	42·3
21	16	3	42	21	16·9	21	14	31	34	19	38·9
22	16	0	20	21	13·7	22	14	28	57	19	35·5
23	15	56	59	21	10·5	23	14	26	21	19	32·1
24	15	53	38	21	7·3	24	14	23	48	19	28·7
25	15	50	18	21	4·1	25	14	21	18	19	25·3
26	15	46	59	21	0·9	26	14	18	49	19	21·9
27	15	43	42	20	57·7	27	14	16	23	19	18·5
28	15	40	25	20	54·5	28	14	14	0	19	15·1
29	15	37	10	20	51·3	29	14	11	39	19	11·6
30	15	33	55	20	48·1	30	14	9	20	19	8·1
						31	14	7	4	19	4·6
31	15	30	42	20	44·9						
32	N.15	27	30	20	41·7	32	N.14	4	51	19	1·1

NOVEMBER, 1860.					
MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N. 14	4	51	19	1·1
2	14	2	41	18	57·6
3	14	0	33	18	54·1
4	13	58	28	18	50·6
5	13	56	26	18	47·1
6	13	54	26	18	43·6
7	13	52	30	18	40·1
8	13	50	37	18	36·6
9	13	48	47	18	33·1
10	13	46	59	18	29·6
11	13	45	15	18	26·0
12	13	43	35	18	22·4
13	13	41	57	18	18·8
14	13	40	23	18	15·2
15	13	38	52	18	11·6
16	13	37	25	18	8·0
17	13	36	1	18	4·4
18	13	34	41	18	0·8
19	13	33	23	17	57·2
20	13	32	10	17	53·5
21	13	31	0	17	49·8
22	13	29	53	17	46·1
23	13	28	51	17	42·4
24	13	27	51	17	38·7
25	13	26	56	17	35·0
26	13	26	4	17	31·3
27	13	25	16	17	27·6
28	13	24	32	17	23·8
29	13	23	51	17	20·0
30	13	23	15	17	16·2
31	13	22	42	17	12·4
32	N. 13	22	13	17	8·6

DECEMBER, 1860.					
MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N. 13	22	42	17	12·4
2	13	22	13	17	8·6
3	13	21	48	17	4·8
4	13	21	27	17	1·0
5	13	21	10	16	57·2
6	13	20	57	16	53·3
7	13	20	48	16	49·4
8	13	20	43	16	45·5
9	13	20	42	16	41·6
10	13	20	45	16	37·7
11	13	20	53	16	33·8
12	13	21	4	16	29·9
13	13	21	19	16	26·0
14	13	21	39	16	22·0
15	13	22	2	16	18·0
16	13	22	30	16	14·0
17	13	23	1	16	10·0
18	13	23	37	16	6·0
19	13	24	17	16	2·0
20	13	25	0	15	58·0
21	13	25	48	15	54·0
22	13	26	39	15	50·0
23	13	27	35	15	45·9
24	13	28	34	15	41·8
25	13	29	37	15	37·7
26	13	30	44	15	33·6
27	13	31	54	15	29·5
28	13	33	9	15	25·4
29	13	34	27	15	21·3
30	13	35	49	15	17·2
31	13	37	14	15	13·1
32	N. 13	38	43	15	8·9

JANUARY, 1860.

MEAN TIME.

Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N. 14	15	3	15	8·8
2	14	16	10	15	4·7
3	14	17	18	15	0·6
4	14	18	28	14	56·5
5	14	19	39	14	52·3
6	14	20	52	14	48·2
7	14	22	7	14	44·1
8	14	23	24	14	39·9
9	14	24	42	14	35·8
10	14	26	1	14	31·6
11	14	27	22	14	27·5
12	14	28	45	14	23·3
13	14	30	9	14	19·2
14	14	31	34	14	15·0
15	14	33	0	14	10·8
16	14	34	28	14	6·7
17	14	35	57	14	2·5
18	14	37	27	13	58·3
19	14	38	59	13	54·1
20	14	40	31	13	49·9
21	14	42	5	13	45·7
22	14	43	39	13	41·5
23	14	45	14	13	37·3
24	14	46	50	13	33·1
25	14	48	27	13	28·8
26	14	50	4	13	24·6
27	14	51	43	13	20·4
28	14	53	21	13	16·2
29	14	55	1	13	11·9
30	14	56	41	13	7·7
31	14	58	21	13	3·5
32	N. 15	0	2	12	59·3

FEBRUARY, 1860.

MEAN TIME.

Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N. 15	0	2	12	59·3
2	15	1	42	12	55·0
3	15	3	24	12	50·8
4	15	5	5	12	46·5
5	15	6	47	12	42·3
6	15	8	28	12	38·1
7	15	10	10	12	33·8
8	15	11	52	12	29·6
9	15	13	33	12	25·3
10	15	15	15	12	21·1
11	15	16	56	12	16·8
12	15	18	37	12	12·6
13	15	20	18	12	8·4
14	15	21	59	12	4·1
15	15	23	39	11	59·9
16	15	25	18	11	55·6
17	15	26	57	11	51·4
18	15	28	36	11	47·2
19	15	30	14	11	42·9
20	15	31	51	11	38·7
21	15	33	28	11	34·4
22	15	35	4	11	30·2
23	15	36	39	11	25·9
24	15	38	13	11	21·7
25	15	39	46	11	17·5
26	15	41	18	11	13·2
27	15	42	49	11	9·0
28	15	44	19	11	4·8
29	15	45	48	11	0·6
30	15	47	16	10	56·3
31	15	48	42	10	52·1
32	N. 15	50	08	10	47·9

MARCH, 1860.							APRIL, 1860.						
MEAN TIME.							MEAN TIME.						
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			GEOCENTRIC. Meridian Passage.			Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			GEOCENTRIC. Meridian Passage.	
	°	′	″	h.	m.			°	′	″	h.	m.
1	N.15	47	16	10	56·3		1	N.16	19	54	8	47·7
2	15	48	42	10	52·1		2	16	20	28	8	43·7
3	15	50	8	10	47·9		3	16	21	0	8	39·6
4	15	51	32	10	43·7		4	16	21	30	8	35·6
5	15	52	54	10	39·5		5	16	21	58	8	31·6
6	15	54	16	10	35·3		6	16	22	24	8	27·6
7	15	55	36	10	31·1		7	16	22	47	8	23·5
8	15	56	54	10	26·9		8	16	23	9	8	19·5
9	15	58	11	10	22·7		9	16	23	29	8	15·5
10	15	59	27	10	18·5		10	16	23	47	8	11·5
11	16	0	41	10	14·3		11	16	24	2	8	7·5
12	16	1	54	10	10·1		12	16	24	16	8	3·5
13	16	3	5	10	5·9		13	16	24	27	7	59·5
14	16	4	14	10	1·7		14	16	24	37	7	55·5
15	16	5	22	9	57·6		15	16	24	44	7	51·5
16	16	6	28	9	53·4		16	16	24	49	7	47·6
17	16	7	32	9	49·3		17	16	24	53	7	43·6
18	16	8	34	9	45·2		18	16	24	54	7	39·6
19	16	9	35	9	41·0		19	16	24	53	7	35·7
20	16	10	34	9	36·9		20	16	24	50	7	31·8
21	16	11	31	9	32·8		21	16	24	45	7	27·8
22	16	12	27	9	28·6		22	16	24	38	7	23·9
23	16	13	20	9	24·5		23	16	24	28	7	20·0
24	16	14	12	9	20·4		24	16	24	17	7	16·1
25	16	15	1	9	16·3		25	16	24	4	7	12·2
26	16	15	49	9	12·2		26	16	23	48	7	8·3
27	16	16	35	9	8·1		27	16	23	31	7	4·4
28	16	17	19	9	4·0		28	16	23	11	7	0·5
29	16	18	1	8	59·9		29	16	22	50	6	56·7
30	16	18	41	8	55·9		30	16	22	26	6	52·8
31	16	19	18	8	51·8		31	16	22	1	6	49·0
32	N.16	19	54	8	47·7		32	N.16	21	33	6	45·2

MAY, 1860.								JUNE, 1860.							
MEAN TIME.								MEAN TIME.							
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.				Meridian Passage.			Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.				Meridian Passage.		
		°	′	″	h.	m.				°	′	″	h.	m.	
1	N.	16	22	1	6	49·0		1	N.	15	53	11	4	52·7	
2		16	21	33	6	45·2		2		15	51	47	4	49·0	
3		16	21	4	6	41·3		3		15	50	22	4	45·4	
4		16	20	32	6	37·5		4		15	48	55	4	41·7	
5		16	19	59	6	33·7		5		15	47	26	4	38·1	
6		16	19	23	6	29·9		6		15	45	56	4	34·5	
7		16	18	46	6	26·0		7		15	44	24	4	30·8	
8		16	18	7	6	22·2		8		15	42	51	4	27·2	
9		16	17	25	6	18·4		9		15	41	16	4	23·6	
10		16	16	42	6	14·6		10		15	39	40	4	20·0	
11		16	15	57	6	10·8		11		15	38	2	4	16·3	
12		16	15	10	6	7·0		12		15	36	23	4	12·7	
13		16	14	22	6	3·2		13		15	34	42	4	9·1	
14		16	13	31	5	59·5		14		15	33	0	4	5·5	
15		16	12	39	5	55·7		15		15	31	17	4	1·9	
16		16	11	44	5	51·9		16		15	29	32	3	58·3	
17		16	10	48	5	48·2		17		15	27	45	3	54·7	
18		16	9	50	5	44·4		18		15	25	58	3	51·1	
19		16	8	50	5	40·7		19		15	24	9	3	47·5	
20		16	7	48	5	37·0		20		15	22	18	3	43·9	
21		16	6	45	5	33·3		21		15	20	26	3	40·4	
22		16	5	39	5	29·5		22		15	18	33	3	36·8	
23		16	4	32	5	25·8		23		15	16	39	3	33·3	
24		16	3	23	5	22·1		24		15	14	43	3	29·7	
25		16	2	13	5	18·4		25		15	12	46	3	26·2	
26		16	1	0	5	14·7		26		15	10	48	3	22·7	
27		15	59	46	5	11·0		27		15	8	49	3	19·1	
28		15	58	31	5	7·3		28		15	6	48	3	15·6	
29		15	57	13	5	3·7		29		15	4	47	3	12·1	
30		15	55	54	5	0·0		30		15	2	44	3	8·6	
31		15	54	34	4	56·3		31		15	0	40	3	5·0	
32	N.	15	53	11	4	52·7		32	N.	14	58	35	3	1·5	

JULY, 1860.						AUGUST, 1860.					
MEAN TIME.						MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.		Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.		°	′	″	h.	m.
1	N. 15	0	40	3	5·0	1	N. 13	48	47	1	16·8
2	14	58	35	3	1·5	2	13	46	17	1	13·4
3	14	56	29	2	58·0	3	13	43	45	1	9·9
4	14	54	21	2	54·5	4	13	41	13	1	6·5
5	14	52	13	2	50·9	5	13	38	41	1	3·1
6	14	50	4	2	47·4	6	13	36	8	0	59·6
7	14	47	53	2	43·9	7	13	33	35	0	56·2
8	14	45	42	2	40·4	8	13	31	1	0	52·7
9	14	43	29	2	36·9	9	13	28	27	0	49·3
10	14	41	16	2	33·4	10	13	25	53	0	45·8
11	14	39	1	2	29·9	11	13	23	18	0	42·3
12	14	36	46	2	26·4	12	13	20	43	0	38·9
13	14	34	30	2	22·9	13	13	18	7	0	35·4
14	14	32	12	2	19·4	14	13	15	32	0	32·0
15	14	29	54	2	15·9	15	13	12	56	0	28·5
16	14	27	35	2	12·4	16	13	10	19	0	25·1
17	14	25	15	2	8·9	17	13	7	43	0	21·7
18	14	22	54	2	5·4	18	13	5	6	0	18·2
19	14	20	33	2	1·9	19	13	2	29	0	14·8
20	14	18	10	1	58·4	20	12	59	52	0	11·3
21	14	15	47	1	54·9	21	12	57	15	0	7·8
22	14	13	23	1	51·4	22	12	54	38	0	4·4
23	14	10	59	1	48·0	23	12	52	1	0 23	0·9 57·5
24	14	8	33	1	44·5	24	12	49	24	23	54·0
25	14	6	7	1	41·0	25	12	46	46	23	50·6
26	14	3	41	1	37·6	26	12	44	9	23	47·2
27	14	1	13	1	34·1	27	12	41	32	23	43·7
28	13	58	45	1	30·7	28	12	38	55	23	40·3
29	13	56	17	1	27·2	29	12	36	17	23	36·9
30	13	53	47	1	23·7	30	12	33	40	23	33·4
31	13	51	18	1	20·3	31	12	31	4	23	30·0
32	N. 13	48	47	1	16·8	32	N. 12	28	27	23	26·5

SEPTEMBER, 1860.				OCTOBER, 1860.		
MEAN TIME.				MEAN TIME.		
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.	GEOCENTRIC. Meridian Passage.		Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.	GEOCENTRIC. Meridian Passage.
	° ′ ″	h. m.			° ′ ″	h. m.
1	N.12 28 27	23 26·5		1	N.11 13 13	21 42·4
2	12 25 50	23 23·1		2	11 10 53	21 38·9
3	12 23 14	23 19·6		3	11 8 35	21 35·4
4	12 20 38	23 16·1		4	11 6 17	21 31·9
5	12 18 1	23 12·7		5	11 4 0	21 28·3
6	12 15 26	23 9·2		6	11 1 45	21 24·8
7	12 12 50	23 5·8		7	10 59 30	21 21·3
8	12 10 15	23 2·3		8	10 57 17	21 17·8
9	12 7 40	22 58·8		9	10 55 5	21 14·3
10	12 5 6	22 55·4		10	10 52 53	21 10·7
11	12 2 31	22 51·9		11	10 50 44	21 7·2
12	11 59 58	22 48·5		12	10 48 35	21 3·7
13	11 57 24	22 45·0		13	10 46 27	21 0·1
14	11 54 52	22 41·5		14	10 44 21	20 56·6
15	11 52 19	22 38·1		15	10 42 17	20 53·0
16	11 49 48	22 34·6		16	10 40 13	20 49·5
17	11 47 16	22 31·2		17	10 38 12	20 45·9
18	11 44 46	22 27·7		18	10 36 11	20 42·3
19	11 42 16	22 24·2		19	10 34 12	20 38·8
20	11 39 46	22 20·8		20	10 32 14	20 35·2
21	11 37 18	22 17·3		21	10 30 18	20 31·6
22	11 34 50	22 13·8		22	10 28 24	20 28·1
23	11 32 22	22 10·4		23	10 26 31	20 24·5
24	11 29 56	22 6·9		24	10 24 39	20 20·9
25	11 27 30	22 3·4		25	10 22 49	20 17·3
26	11 25 5	21 59·9		26	10 21 1	20 13·7
27	11 22 41	21 56·4		27	10 19 15	20 10·1
28	11 20 18	21 52·9		28	10 17 30	20 6·5
29	11 17 55	21 49·4		29	10 15 47	20 2·9
30	11 15 34	21 45·9		30	10 14 5	19 59·2
				31	10 12 25	19 55·6
31	11 13 13	21 42·4				
32	N.11 10 53	21 38·9		32	N.10 10 48	19 52·0

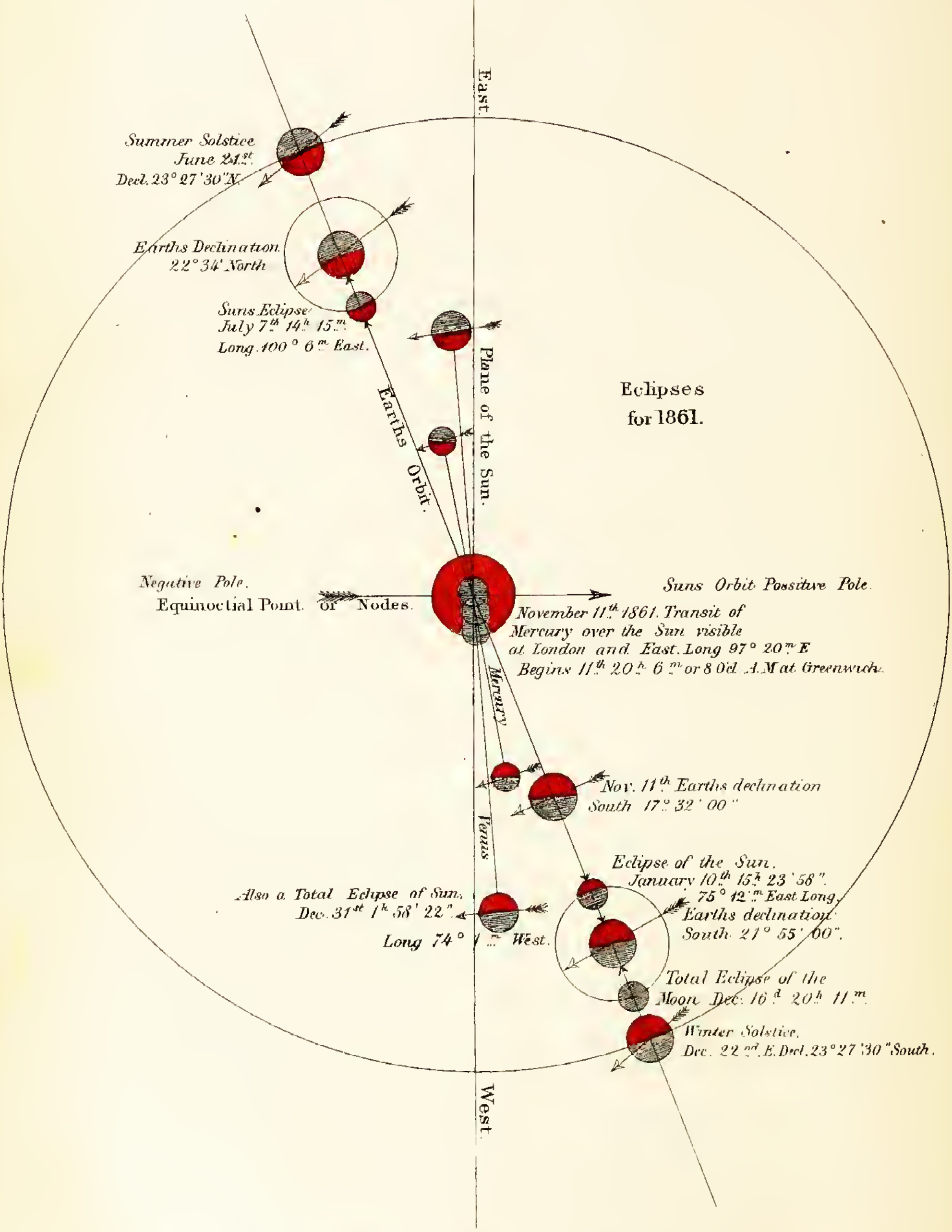
NOVEMBER, 1860.							DECEMBER, 1860.						
MEAN TIME.							MEAN TIME.						
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.			Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.		
	°	′	″	h.	m.			°	′	″	h.	m.	
1	N. 10	10	48	19	52·0		1	N. 9	37	45	18	0·6	
2	10	9	11	19	48·3		2	9	37	15	17	56·8	
3	10	7	37	19	44·7		3	9	36	46	17	53·0	
4	10	6	5	19	41·0		4	9	36	20	17	49·1	
5	10	4	34	19	37·4		5	9	35	57	17	45·3	
6	10	3	6	19	33·8		6	9	35	36	17	41·5	
7	10	1	39	19	30·1		7	9	35	17	17	37·6	
8	10	0	14	19	26·5		8	9	35	1	17	33·8	
9	9	58	52	19	22·8		9	9	34	48	17	29·9	
10	9	57	31	19	19·1		10	9	34	37	17	26·1	
11	9	56	12	19	15·4		11	9	34	28	17	22·2	
12	9	54	56	19	11·8		12	9	34	23	17	18·3	
13	9	53	41	19	8·1		13	9	34	19	17	14·5	
14	9	52	29	19	4·4		14	9	34	19	17	10·6	
15	9	51	19	19	0·7		15	9	34	20	17	6·7	
16	9	50	11	18	57·0		16	9	34	25	17	2·8	
17	9	49	5	18	53·3		17	9	34	32	16	58·9	
18	9	48	2	18	49·6		18	9	34	41	16	55·0	
19	9	47	1	18	45·8		19	9	34	53	16	51·0	
20	9	46	2	18	42·1		20	9	35	7	16	47·1	
21	9	45	5	18	38·4		21	9	35	24	16	43·2	
22	9	44	10	18	34·6		22	9	35	44	16	39·2	
23	9	43	18	18	30·9		23	9	36	6	16	35·3	
24	9	42	28	18	27·1		24	9	36	30	16	31·3	
25	9	41	41	18	23·4		25	9	36	57	16	27·4	
26	9	40	56	18	19·6		26	9	37	26	16	23·4	
27	9	40	13	18	15·8		27	9	37	58	16	19·4	
28	9	39	32	18	12·0		28	9	38	32	16	15·4	
29	9	38	54	18	8·2		29	9	39	9	16	11·4	
30	9	38	19	18	4·4		30	9	39	48	16	7·4	
							31	9	40	29	16	3·4	
31	9	37	45	18	0·6								
32	N. 9	37	15	17	56·8		32	N. 9	41	13	15	59·4	

NAUTICAL ALMANAC

FOR THE YEAR

1861.

N.º 8.



By this Mechanical arrangement, can be seen the magnetic polarity of the heavenly bodies, claimed as a physical law of motion, of matter, and of space.

Lith of J Bien, 60 Fulton Str N.Y

ECLIPSES OF THE SUN AND MOON.

In the year 1861 there will be three Eclipses of the Sun, one of the Moon, and a Transit of Mercury over the Sun's disk.

I.—*An Annular Eclipse of the SUN, January* 10, 1861, *invisible at Greenwich.*

ELEMENTS.

		d.	h.	m.	s.
Greenwich Mean Time of ☌ in R. A.	Jan.	10	15	23	58
☾'s and ☉'s Right Ascension			19	30	40
			°	′	″
☉'s Declination	S.		21	59	34
☾'s Declination	S.		21	49	20

Begins on the Earth generally January $10^d\ 12^h\ 34^m\cdot9$, Mean Time at Greenwich, in Longitude 75° 12′ E. of Greenwich, and Latitude 19° 32′ S.

II.—*An Annular Eclipse of the SUN, July* 7, 1861, *invisible at Greenwich.*

ELEMENTS.

		d.	h.	m.	s.
Greenwich Mean Time of ☌ in R. A.	July	7	14	15	7
☾'s and ☉'s Right Ascension			7	8	44
			°	′	″
☉'s Declination	N.		22	18	7
☾'s Declination	N.		22	31	3

Begins on the Earth generally July $7^d\ 11^h\ 17^m\cdot8$, Mean Time at Greenwich, in Longitude 100° 6′ E. of Greenwich, and Latitude 3° 54′ N.

III.—*A Partial Eclipse of the MOON, Dec.* 16, 1861, *partly visible at Greenwich.*

ELEMENTS.

		d.	h.	m.	s.
Greenwich Mean Time of ☍ in R. A.	Dec.	16	20	11	16
☉'s Right Ascension			5	40	8
			°	′	″
☉'s Declination	N.		24	11	24
☾'s Declination	S.		23	22	44

Longitude 88° 10′ W. of Greenwich. Latitude 24° 24′ N.

IV.—*A Total Eclipse of the SUN, December* 30–31, 1861, *visible (as a partial one) at Greenwich.*

ELEMENTS.

		d.	h.	m.	s.
Greenwich Mean Time of ☌ in R. A.	Dec.	31	1	58	22
☾'s and ☉'s Right Ascension			18	43	19
			°	′	″
☉'s Declination	S.		22	33	24
☾'s Declination	S.		23	5	1

Begins on the Earth generally December $30^d\ 23^h\ 14^m\cdot8$, Mean Time at Greenwich, in Longitude 74° 1′ W. of Greenwich, and Latitude 9° 1′ N.

A Transit of Mercury over the Sun's disk, Nov. 11, 1861, *partly visible at Greenwich.*

ELEMENTS.

		d.	h.	m.	s.
Greenwich Mean Time of ☌ in R. A.	Nov.	11	20	5	58
☉'s and ☿'s Right Ascension			15	10	3
			°	′	″
☿'s Declination	S.		17	32	40
☉'s Declination	S.		17	44	43

Longitude 97° 20′ E. of Greenwich. Latitude 17° 49′ S.

PHASES OF THE MOON FOR 1861.

JANUARY.

	d.	h.	m.
Last Quarter . . .	3	13	53·8
New Moon	10	15	27·1
First Quarter . . .	18	16	0·0
Full Moon	26	5	6·5

FEBRUARY.

	d.	h.	m.
Last Quarter . . .	1	21	59·0
New Moon	9	8	4·8
First Quarter . . .	17	12	19·4
Full Moon	24	16	42·8

MARCH.

	d.	h.	m.
Last Quarter . . .	3	7	15·9
New Moon	11	1	37·5
First Quarter . . .	19	5	31·6
Full Moon	26	2	14·9

APRIL.

	d.	h.	m.
Last Quarter . . .	1	18	23·9
New Moon	9	18	56·1
First Quarter . . .	17	18	45·3
Full Moon	24	10	23·0

MAY.

	d.	h.	m.
Last Quarter . . .	1	7	31·8
New Moon	9	11	7·5
First Quarter . . .	17	4	2·8
Full Moon	23	18	5·7
Last Quarter . . .	30	22	25·0

JUNE.

	d.	h.	m.
New Moon	8	1	38·2
First Quarter . . .	15	10	15·6
Full Moon	22	2	22·7
Last Quarter . . .	29	14	40·4

JULY.

	d.	h.	m.
New Moon	7	14	12·1
First Quarter . . .	14	14	47·3
Full Moon	21	12	5·5
Last Quarter . . .	29	7	51·4

AUGUST.

	d.	h.	m.
New Moon	6	0	53·7
First Quarter . . .	12	19	15·3
Full Moon	19	23	50·9
Last Quarter . . .	28	1	23·1

SEPTEMBER.

	d.	h.	m.
New Moon	4	10	11·9
First Quarter . . .	11	1	15·9
Full Moon	18	14	1·4
Last Quarter . . .	26	18	24·1

OCTOBER.

	d.	h.	m.
New Moon	3	18	56·3
First Quarter . . .	10	10	8·9
Full Moon	18	6	37·9
Last Quarter . . .	26	9	54·0

NOVEMBER.

	d.	h.	m.
New Moon	2	4	3·3
First Quarter . . .	8	22	44·2
Full Moon	17	1	6·6
Last Quarter . . .	24	23	6·6

DECEMBER.

	d.	h.	m.
New Moon	1	14	16·7
First Quarter . . .	8	15	9·5
Full Moon	16	20	7·7
Last Quarter . . .	24	9	51·2
New Moon	31	1	54·2

1861. AT GREENWICH APPARENT NOON. 1861.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, to be added to Apparent Time.	Diff. for 1 hr.
JANUARY, 1861.					
		° ′ ″	″	m. s.	s.
Tues.	1	S. 22 59 27	13	3 58	1
Wed.	2	22 54 7	14	4 26	1
Thur.	3	22 48 19	15	4 54	1
Fri.	4	22 42 4	16	5 21	1
Sat.	5	22 35 22	17	5 48	1
Sun.	6	22 28 13	18	6 15	1
Mon.	7	22 20 38	20	6 41	1
Tues.	8	22 12 36	21	7 6	1
Wed.	9	22 4 7	22	7 31	1
Thur.	10	21 55 13	23	7 56	0
Fri.	11	21 45 53	24	8 20	0
Sat.	12	21 36 8	25	8 43	0
Sun.	13	21 25 58	26	9 6	0
Mon.	14	21 15 23	27	9 28	0
Tues.	15	21 4 24	28	9 49	0
Wed.	16	20 53 0	29	10 10	0
Thur.	17	20 41 13	30	10 30	0
Fri.	18	20 29 2	31	10 49	0
Sat.	19	20 16 28	32	11 7	0
Sun.	20	20 3 31	33	11 25	0
Mon.	21	19 50 12	34	11 42	0
Tues.	22	19 36 31	35	11 58	0
Wed.	23	19 22 28	36	12 13	0
Thur.	24	19 8 4	36	12 28	0
Fri.	25	18 53 19	37	12 41	0
Sat.	26	18 38 13	38	12 54	0
Sun.	27	18 22 47	39	13 6	0
Mon.	28	18 7 2	40	13 18	0
Tues.	29	17 50 56	41	13 28	0
Wed.	30	17 34 32	41	13 38	0
Thur.	31	17 17 48	42	13 47	0
Fri.	32	S. 17 0 47		13 55	

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, to be added to Apparent Time.	Diff. for 1 hr.
FEBRUARY, 1861.					
		° ′ ″	″	m. s.	s.
Fri.	1	S. 17 0 47	43	13 55	0
Sat.	2	16 43 27	44	14 2	0
Sun.	3	16 25 50	44	14 8	0
Mon.	4	16 7 55	45	14 14	0
Tues.	5	15 49 44	46	14 19	0
Wed.	6	15 31 17	46	14 23	0
Thur.	7	15 12 33	47	14 26	0
Fri.	8	14 53 35	48	14 29	0
Sat.	9	14 34 21	48	14 30	0
Sun.	10	14 14 52	49	14 31	0
Mon.	11	13 55 10	49	14 31	0
Tues.	12	13 35 13	50	14 30	0
Wed.	13	13 15 4	50	14 29	0
Thur.	14	12 54 42	51	14 27	0
Fri.	15	12 34 7	51	14 24	0
Sat.	16	12 13 20	52	14 20	0
Sun.	17	11 52 22	52	14 16	0
Mon.	18	11 31 13	53	14 11	0
Tues.	19	11 9 53	53	14 5	0
Wed.	20	10 48 23	54	13 58	0
Thur.	21	10 26 43	54	13 51	0
Fri.	22	10 4 53	54	13 43	0
Sat.	23	9 42 54	55	13 35	0
Sun.	24	9 20 46	55	13 26	0
Mon.	25	8 58 30	56	13 16	0
Tues.	26	8 36 7	56	13 6	0
Wed.	27	8 13 35	56	12 55	0
Thur.	28	7 50 56	56	12 44	0
Fri.	29	S. 7 28 10		12 32	

MARCH, 1861.

Day of the Week.	Day of the Month.	THE SUN'S *Apparent* Declination.	Diff. for 1 hr.	Equation of Time, *to be added to Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Fri.	1	S. 7 28 10	57	12 32	0
Sat.	2	7 5 18	57	12 19	0
Sun.	3	6 42 20	57	12 7	0
Mon.	4	6 19 16	57	11 53	0
Tues.	5	5 56 6	58	11 40	0
Wed.	6	5 32 52	58	11 26	0
Thur.	7	5 9 33	58	11 11	0
Fri.	8	4 46 10	58	10 56	0
Sat.	9	4 22 43	58	10 41	0
Sun.	10	3 59 13	58	10 25	0
Mon.	11	3 35 40	58	10 9	0
Tues.	12	3 12 5	59	9 53	0
Wed.	13	2 48 27	59	9 37	0
Thur.	14	2 24 48	59	9 20	0
Fri.	15	2 1 7	59	9 3	0
Sat.	16	1 37 25	59	8 46	0
Sun.	17	1 13 43	59	8 28	0
Mon.	18	0 50 1	59	8 10	0
Tues.	19	0 26 19	59	7 53	0
Wed.	20	S. 0 2 37	59	7 34	0
Thur.	21	N. 0 21 3	59	7 16	0
Fri.	22	0 44 43	59	6 58	0
Sat.	23	1 8 21	59	6 39	0
Sun.	24	1 31 57	58	6 21	0
Mon.	25	1 55 30	58	6 2	0
Tues.	26	2 19 2	58	5 44	0
Wed.	27	2 42 30	58	5 25	0
Thur.	28	3 5 55	58	5 7	0
Fri.	29	3 29 17	58	4 48	0
Sat.	30	3 52 35	58	4 30	0
Sun.	31	4 15 48	57	4 11	0
Mon.	32	N. 4 38 58		3 53	

APRIL, 1861.

Day of the Week.	Day of the Month.	THE SUN'S *Apparent* Declination.	Diff. for 1 hr.	Equation of Time, *to be added to* / *subt. from Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Mon.	1	N. 4 38 58	57	3 53	0
Tues.	2	5 2 2	57	3 35	0
Wed.	3	5 25 1	57	3 17	0
Thur.	4	5 47 54	56	2 59	0
Fri.	5	6 10 42	56	2 41	0
Sat.	6	6 33 23	56	2 24	0
Sun.	7	6 55 58	56	2 7	0
Mon.	8	7 18 25	55	1 50	0
Tues.	9	7 40 45	55	1 33	0
Wed.	10	8 2 58	55	1 17	0
Thur.	11	8 25 2	54	1 0	0
Fri.	12	8 46 58	54	0 45	0
Sat.	13	9 8 45	54	0 29	0
Sun.	14	9 30 22	53	0 14	0
Mon.	15	9 51 50	53	0 0	0
Tues.	16	10 13 9	52	0 15	0
Wed.	17	10 34 17	52	0 29	0
Thur.	18	10 55 15	51	0 43	0
Fri.	19	11 16 1	51	0 57	0
Sat.	20	11 36 37	51	1 10	0
Sun.	21	11 57 1	50	1 22	0
Mon.	22	12 17 14	50	1 35	0
Tues.	23	12 37 14	49	1 47	0
Wed.	24	12 57 2	48	1 58	0
Thur.	25	13 16 37	48	2 9	0
Fri.	26	13 35 59	47	2 19	0
Sat.	27	13 55 8	47	2 29	0
Sun.	28	14 14 3	46	2 39	0
Mon.	29	14 32 45	46	2 48	0
Tues.	30	14 51 12	45	2 56	0
Wed.	31	N.15 9 24		3 4	

1861. AT GREENWICH APPARENT NOON. 1861.

MAY, 1861.						JUNE, 1861.					
Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, *to be subt. from Apparent Time.*	Diff. for 1 hr.	Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, *to be subt. from* / *added to Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.			° ′ ″	″	m. s.	s.
Wed.	1	N.15 9 24	44	3 4	0	Sat.	1	N.22 5 49	19	2 29	0
Thur.	2	15 27 22	44	3 11	0	*Sun.*	2	22 13 43	18	2 20	0
Fri.	3	15 45 4	43	3 18	0	Mon.	3	22 21 12	17	2 10	0
Sat.	4	16 2 31	42	3 24	0	Tues.	4	22 28 19	16	2 0	0
Sun.	5	16 19 42	42	3 29	0	Wed.	5	22 35 1	15	1 50	0
Mon.	6	16 36 37	41	3 34	0	Thur.	6	22 41 20	14	1 39	0
Tues.	7	16 53 16	40	3 38	0	Fri.	7	22 47 16	13	1 28	0
Wed.	8	17 9 37	40	3 42	0	Sat.	8	22 52 47	12	1 17	0
Thur.	9	17 25 42	39	3 45	0	*Sun.*	9	22 57 54	11	1 5	0
Fri.	10	17 41 28	38	3 48	0	Mon.	10	23 2 37	10	0 53	0
Sat.	11	17 56 58	37	3 50	0	Tues.	11	23 6 55	9	0 41	0
Sun.	12	18 12 9	37	3 52	0	Wed.	12	23 10 50	8	0 29	0
Mon.	13	18 27 1	36	3 52	0	Thur.	13	23 14 19	7	0 17	0
Tues.	14	18 41 36	35	3 53	0	Fri.	14	23 17 24	6	0 4	0
Wed.	15	18 55 51	34	3 53	0	Sat.	15	23 20 5	5	0 7	0
Thur.	16	19 9 47	34	3 52	0	*Sun.*	16	23 22 20	4	0 20	0
Fri.	17	19 23 23	33	3 51	0	Mon.	17	23 24 11	3	0 33	0
Sat.	18	19 36 40	32	3 49	0	Tues.	18	23 25 38	2	0 46	0
Sun.	19	19 49 37	31	3 46	0	Wed.	19	23 26 39	1	0 59	0
Mon.	20	20 2 13	30	3 43	0	Thur.	20	23 27 16	0	1 12	0
Tues.	21	20 14 29	29	3 40	0	Fri.	21	23 27 28	0	1 25	0
Wed.	22	20 26 24	28	3 36	0	Sat.	22	23 27 15	1	1 38	0
Thur.	23	20 37 59	28	3 32	0	*Sun.*	23	23 26 38	2	1 50	0
Fri.	24	20 49 12	27	3 27	0	Mon.	24	23 25 36	3	2 3	0
Sat.	25	21 0 4	26	3 21	0	Tues.	25	23 24 9	4	2 16	0
Sun.	26	21 10 34	25	3 15	0	Wed.	26	23 22 17	5	2 28	0
Mon.	27	21 20 42	24	3 9	0	Thur.	27	23 20 1	6	2 41	0
Tues.	28	21 30 29	23	3 2	0	Fri.	28	23 17 20	7	2 53	0
Wed.	29	21 39 53	22	2 54	0	Sat.	29	23 14 14	8	3 5	0
Thur.	30	21 48 54	21	2 46	0	*Sun.*	30	23 10 44	9	3 17	0
Fri.	31	21 57 33	20	2 38	0	Mon.	31	N.23 6 50		3 29	
Sat.	32	N.22 5 49		2 29							

1861. AT GREENWICH APPARENT NOON. 1861.

JULY, 1861.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, to be added to Apparent Time.	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Mon.	1	N.23 6 50	10	3 29	0
Tues.	2	23 2 31	11	3 40	0
Wed.	3	22 57 48	12	3 51	0
Thur.	4	22 52 41	13	4 2	0
Fri.	5	22 47 10	14	4 13	0
Sat.	6	22 41 16	15	4 23	0
Sun.	7	22 34 57	16	4 33	0
Mon.	8	22 28 15	17	4 43	0
Tues.	9	22 21 10	18	4 52	0
Wed.	10	22 13 42	19	5 1	0
Thur.	11	22 5 50	20	5 9	0
Fri.	12	21 57 36	21	5 17	0
Sat.	13	21 49 0	22	5 24	0
Sun.	14	21 40 1	23	5 31	0
Mon.	15	21 30 40	24	5 37	0
Tues.	16	21 20 57	25	5 43	0
Wed.	17	21 10 53	26	5 48	0
Thur.	18	21 0 27	26	5 53	0
Fri.	19	20 49 39	27	5 57	0
Sat.	20	20 38 31	28	6 1	0
Sun.	21	20 27 2	29	6 4	0
Mon.	22	20 15 12	30	6 7	0
Tues.	23	20 3 2	31	6 9	0
Wed.	24	19 50 32	32	6 10	0
Thur.	25	19 37 42	32	6 11	0
Fri.	26	19 24 32	33	6 11	0
Sat.	27	19 11 3	34	6 11	0
Sun.	28	18 57 15	35	6 10	0
Mon.	29	18 43 8	36	6 8	0
Tues.	30	18 28 43	36	6 6	0
Wed.	31	18 13 59	37	6 4	0
Thur.	32	N.17 58 57		6 0	

AUGUST, 1861.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, to be added to / subt. from Apparent Time.	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Thur.	1	N.17 58 57	38	6 0	0
Fri.	2	17 43 37	39	5 57	0
Sat.	3	17 28 0	39	5 52	0
Sun.	4	17 12 6	40	5 47	0
Mon.	5	16 55 56	41	5 42	0
Tues.	6	16 39 28	41	5 35	0
Wed.	7	16 22 45	42	5 29	0
Thur.	8	16 5 45	43	5 21	0
Fri.	9	15 48 31	43	5 13	0
Sat.	10	15 31 1	44	5 5	0
Sun.	11	15 13 16	44	4 55	0
Mon.	12	14 55 17	45	4 46	0
Tues.	13	14 37 3	46	4 35	0
Wed.	14	14 18 36	46	4 25	0
Thur.	15	13 59 55	47	4 13	0
Fri.	16	13 41 1	47	4 1	0
Sat.	17	13 21 54	48	3 49	0
Sun.	18	13 2 34	48	3 36	0
Mon.	19	12 43 2	49	3 22	0
Tues.	20	12 23 18	49	3 8	0
Wed.	21	12 3 22	50	2 54	0
Thur.	22	11 43 14	50	2 39	0
Fri.	23	11 22 56	51	2 23	0
Sat.	24	11 2 26	51	2 7	0
Sun.	25	10 41 46	52	1 51	0
Mon.	26	10 20 55	52	1 35	0
Tues.	27	9 59 54	52	1 18	0
Wed.	28	9 38 44	53	1 0	0
Thur.	29	9 17 25	53	0 43	0
Fri.	30	8 55 56	54	0 25	0
Sat.	31	8 34 19	54	0 6	0
Sun.	32	N. 8 12 33		0 11	

1861. AT GREENWICH APPARENT NOON. 1861.

SEPTEMBER, 1861.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, *to be subt. from Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Sun.	1	N. 8 12 33	54	0 11	0
Mon.	2	7 50 39	55	0 30	0
Tues.	3	7 28 38	55	0 49	0
Wed.	4	7 6 30	55	1 9	0
Thur.	5	6 44 14	55	1 28	0
Fri.	6	6 21 52	56	1 48	0
Sat.	7	5 59 23	56	2 8	0
Sun.	8	5 36 49	56	2 28	0
Mon.	9	5 14 9	56	2 49	0
Tues.	10	4 51 24	57	3 9	0
Wed.	11	4 28 34	57	3 30	0
Thur.	12	4 5 40	57	3 51	0
Fri.	13	3 42 41	57	4 12	0
Sat.	14	3 19 38	57	4 33	0
Sun.	15	2 56 32	57	4 54	0
Mon.	16	2 33 23	58	5 16	0
Tues.	17	2 10 10	58	5 37	0
Wed.	18	1 46 55	58	5 58	0
Thur.	19	1 23 37	58	6 19	0
Fri.	20	1 0 18	58	6 40	0
Sat.	21	0 36 57	58	7 1	0
Sun.	22	N. 0 13 34	58	7 22	0
Mon.	23	S. 0 9 49	58	7 43	0
Tues.	24	0 33 13	58	8 4	0
Wed.	25	0 56 38	58	8 24	0
Thur.	26	1 20 3	58	8 45	0
Fri.	27	1 43 28	58	9 5	0
Sat.	28	2 6 52	58	9 25	0
Sun.	29	2 30 15	58	9 44	0
Mon.	30	2 53 37	58	10 4	0
Tues.	31	S. 3 16 57		10 23	

OCTOBER, 1861.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, *to be subt. from Apparent Time.*	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Tues.	1	S. 3 16 57	58	10 23	0
Wed.	2	3 40 15	58	10 42	0
Thur.	3	4 3 31	58	11 0	0
Fri.	4	4 26 43	57	11 18	0
Sat.	5	4 49 53	57	11 36	0
Sun.	6	5 12 58	57	11 54	0
Mon.	7	5 36 0	57	12 11	0
Tues.	8	5 58 57	57	12 27	0
Wed.	9	6 21 50	56	12 43	0
Thur.	10	6 44 37	56	12 59	0
Fri.	11	7 7 19	56	13 14	0
Sat.	12	7 29 55	56	13 29	0
Sun.	13	7 52 25	55	13 44	0
Mon.	14	8 14 48	55	13 57	0
Tues.	15	8 37 4	55	14 11	0
Wed.	16	8 59 12	55	14 24	0
Thur.	17	9 21 13	54	14 36	0
Fri.	18	9 43 6	54	14 47	0
Sat.	19	10 4 51	53	14 58	0
Sun.	20	10 26 26	53	15 9	0
Mon.	21	10 47 53	53	15 18	0
Tues.	22	11 9 10	52	15 27	0
Wed.	23	11 30 16	52	15 36	0
Thur.	24	11 51 13	51	15 43	0
Fri.	25	12 11 59	51	15 50	0
Sat.	26	12 32 33	50	15 56	0
Sun.	27	12 52 56	50	16 2	0
Mon.	28	13 13 8	49	16 6	0
Tues.	29	13 33 6	49	16 10	0
Wed.	30	13 52 52	48	16 13	0
Thur.	31	14 12 25	48	16 16	0
Fri.	32	S. 14 31 44		16 17	

1861. AT GREENWICH APPARENT NOON. 1861.

NOVEMBER, 1861.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, to be subt. from Apparent Time.	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Fri.	1	S. 14 31 44	47	16 17	0
Sat.	2	14 50 49	47	16 18	0
Sun.	3	15 9 39	46	16 17	0
Mon.	4	15 28 15	45	16 17	0
Tues.	5	15 46 35	45	16 15	0
Wed.	6	16 4 39	44	16 12	0
Thur.	7	16 22 27	43	16 9	0
Fri.	8	16 39 58	43	16 4	0
Sat.	9	16 57 13	42	15 59	0
Sun.	10	17 14 10	41	15 53	0
Mon.	11	17 30 49	40	15 47	0
Tues.	12	17 47 10	40	15 39	0
Wed.	13	18 3 13	39	15 31	0
Thur.	14	18 18 56	38	15 21	0
Fri.	15	18 34 21	37	15 11	0
Sat.	16	18 49 25	36	15 1	0
Sun.	17	19 4 10	36	14 49	0
Mon.	18	19 18 34	35	14 36	0
Tues.	19	19 32 37	34	14 23	0
Wed.	20	19 46 19	33	14 9	0
Thur.	21	19 59 39	32	13 54	0
Fri.	22	20 12 38	31	13 38	0
Sat.	23	20 25 14	30	13 21	0
Sun.	24	20 37 28	29	13 4	0
Mon.	25	20 49 18	28	12 45	0
Tues.	26	21 0 46	27	12 26	0
Wed.	27	21 11 49	26	12 7	0
Thur.	28	21 22 29	25	11 46	0
Fri.	29	21 32 44	24	11 25	0
Sat.	30	21 42 35	23	11 3	0
Sun.	31	S. 21 52 1		10 40	

DECEMBER, 1861.

Day of the Week.	Day of the Month.	THE SUN'S Apparent Declination.	Diff. for 1 hr.	Equation of Time, to be subt. from / added to Apparent Time.	Diff. for 1 hr.
		° ′ ″	″	m. s.	s.
Sun.	1	S. 21 52 1	22	10 40	0
Mon.	2	22 1 1	21	10 17	0
Tues.	3	22 9 36	20	9 53	1
Wed.	4	22 17 45	19	9 29	1
Thur.	5	22 25 29	18	9 4	1
Fri.	6	22 32 45	17	8 38	1
Sat.	7	22 39 36	15	8 12	1
Sun.	8	22 46 0	14	7 46	1
Mon.	9	22 51 56	13	7 19	1
Tues.	10	22 57 26	12	6 52	1
Wed.	11	23 2 29	11	6 24	1
Thur.	12	23 7 4	10	5 56	1
Fri.	13	23 11 11	9	5 28	1
Sat.	14	23 14 51	8	4 59	1
Sun.	15	23 18 3	6	4 30	1
Mon.	16	23 20 47	5	4 1	1
Tues.	17	23 23 3	4	3 32	1
Wed.	18	23 24 51	3	3 2	1
Thur.	19	23 26 11	2	2 32	1
Fri.	20	23 27 2	0	2 3	1
Sat.	21	23 27 26	0	1 33	1
Sun.	22	23 27 21	1	1 3	1
Mon.	23	23 26 47	2	0 33	1
Tues.	24	23 25 45	3	0 3	1
Wed.	25	23 24 15	4	0 26	1
Thur.	26	23 22 17	6	0 56	1
Fri.	27	23 19 50	7	1 26	1
Sat.	28	23 16 55	8	1 55	1
Sun.	29	23 13 32	9	2 25	1
Mon.	30	23 9 41	10	2 54	1
Tues.	31	23 5 23	11	3 23	1
Wed.	32	S. 23 0 36		3 51	

THE MOON'S RIGHT ASCENSION AND DECLINATION.

JANUARY, 1861.				FEBRUARY, 1861.			
MEAN TIME.				MEAN TIME.			
RIGHT ASCENSION.		DECLINATION.		RIGHT ASCENSION.		DECLINATION.	
Day.	Midnight.	Noon.	Midnight.	Day.	Midnight.	Noon.	Midnight.
	h. m. s.	° ′ ″	° ′ ″		h. m. s.	° ′ ″	° ′ ″
1	10 55 36	N. 5 12 0	N. 2 23 18	1	14 14 38	S. 16 47 11	S. 18 54 0
2	11 46 37	S. 0 57 56	S. 3 47 39	2	15 12 9	21 5 15	22 38 52
3	12 38 18	7 4 53	9 46 48	3	16 11 17	24 7 6	25 1 42
4	13 31 36	12 49 35	15 14 49	4	17 10 58	25 41 39	25 54 24
5	14 27 15	17 52 37	19 52 18	5	18 9 50	25 44 51	25 16 36
6	15 25 25	21 54 51	23 20 40	6	19 6 33	24 20 40	23 15 41
7	16 25 32	24 38 57	25 24 24	7	20 0 16	21 40 2	20 4 56
8	17 26 15	25 52 35	25 54 39	8	20 50 48	17 58 6	16 0 24
9	18 25 52	25 31 47	24 51 56	9	21 38 25	13 31 18	11 18 23
10	19 22 52	23 42 19	22 26 4	10	22 23 44	8 35 19	6 13 48
11	20 16 26	20 37 54	18 53 10	11	23 7 34	S. 3 24 5	S. 0 59 41
12	21 6 28	16 36 20	14 31 31	12	23 50 43	N. 1 50 23	N. 4 12 40
13	21 53 28	11 55 38	9 38 22	13	0 34 4	6 57 33	9 13 15
14	22 38 11	6 51 45	S. 4 28 27	14	1 18 23	11 47 47	13 52 34
15	23 21 33	S. 1 37 57	N. 0 46 9	15	2 4 28	16 11 36	18 0 59
16	0 4 30	N. 3 34 57	5 55 30	16	2 52 54	19 58 59	21 28 2
17	0 47 59	8 37 39	10 50 33	17	3 44 5	22 58 56	24 2 20
18	1 32 55	13 21 17	15 22 21	18	4 38 1	24 59 38	25 31 55
19	2 20 5	17 36 23	19 20 51	19	5 34 13	25 49 24	25 45 42
20	3 10 9	21 12 5	22 34 23	20	6 31 45	25 18 32	24 35 49
21	4 3 23	23 55 47	24 49 40	21	7 29 32	23 21 56	21 59 56
22	4 59 31	25 33 45	25 53 3	22	8 26 37	20 0 57	18 2 45
23	5 57 41	25 53 7	25 33 6	23	9 22 34	15 24 17	12 56 13
24	6 56 34	24 45 7	23 43 59	24	10 17 23	9 47 24	6 58 24
25	7 54 51	22 8 6	20 28 0	25	11 11 37	N. 3 31 3	N. 0 31 56
26	8 51 35	18 9 5	15 55 56	26	12 6 0	S. 3 0 28	S. 5 57 56
27	9 46 29	13 2 47	10 25 16	27	13 1 20	9 21 22	12 5 22
28	10 39 54	7 9 12	N. 4 17 29	28	13 58 15	S. 15 6 12	S. 17 25 44
29	11 32 31	N. 0 50 52	S. 2 4 29				
30	12 25 17	S. 5 29 13	8 17 53				
31	13 19 6	S. 11 28 51	S. 14 1 4				

THE MOON'S RIGHT ASCENSION AND DECLINATION.

MARCH, 1861.				APRIL, 1861.			
MEAN TIME.				MEAN TIME.			
RIGHT ASCENSION.		DECLINATION.		RIGHT ASCENSION.		DECLINATION.	
Day.	Midnight.	Noon.	Midnight.	Day.	Midnight.	Noon.	Midnight.
	h. m. s.	° ′ ″	° ′ ″		h. m. s.	° ′ ″	° ′ ″
1	14 56 57	S. 19 51 55	S. 21 37 47	1	18 39 26	S. 24 48 42	S. 24 0 47
2	15 57 1	23 19 53	24 25 38	2	19 34 52	22 43 42	21 23 5
3	16 57 25	25 18 6	25 40 55	3	20 26 35	19 32 5	17 46 45
4	17 56 44	25 42 46	25 23 49	4	21 14 58	15 31 0	13 28 15
5	18 53 45	24 38 34	23 42 21	5	22 0 44	10 55 47	8 41 55
6	19 47 40	22 16 43	20 49 45	6	22 44 44	5 59 35	S. 3 39 57
7	20 38 20	18 52 2	17 1 31	7	23 27 51	S. 0 53 40	N. 1 26 58
8	21 26 5	14 40 7	12 32 56	8	0 10 55	N. 4 11 45	6 28 54
9	22 11 33	9 55 40	7 38 6	9	0 54 43	9 6 53	11 16 0
10	22 55 28	S. 4 51 56	S. 2 29 35	10	1 39 56	13 41 43	15 38 3
11	23 38 39	N. 0 19 12	N. 2 41 19	11	2 27 5	17 45 45	19 24 17
12	0 21 54	5 26 59	7 44 8	12	3 16 28	21 7 57	22 23 35
13	1 5 57	10 21 13	12 28 47	13	4 8 5	23 37 15	24 25 8
14	1 51 29	14 51 48	16 45 8	14	5 1 31	25 3 26	25 19 32
15	2 39 3	18 48 30	20 22 45	15	5 56 4	25 18 30	25 0 15
16	3 28 58	22 0 39	23 10 51	16	6 50 53	24 17 57	23 24 42
17	4 21 16	24 17 24	24 58 42	17	7 45 15	22 1 34	20 34 44
18	5 15 34	25 28 26	25 36 35	18	8 38 47	18 33 35	16 36 24
19	6 11 11	25 25 13	24 57 19	19	9 31 32	14 2 2	11 39 23
20	7 7 16	24 2 30	22 57 40	20	10 23 58	8 38 28	N. 5 56 45
21	8 3 2	21 19 43	19 39 25	21	11 16 50	N. 2 37 52	S. 0 14 46
22	8 58 4	17 21 32	15 9 44	22	12 11 5	S. 3 40 51	6 34 17
23	9 52 25	12 18 0	9 41 0	23	13 7 36	9 54 30	12 36 46
24	10 46 29	6 24 15	N. 3 30 39	24	14 7 0	15 36 8	17 54 14
25	11 41 1	N. 0 0 17	S. 2 59 16	25	15 9 12	20 17 31	21 59 14
26	12 36 49	S. 6 29 37	9 22 54	26	16 13 14	23 33 40	24 30 17
27	13 34 36	12 38 13	15 12 20	27	17 17 16	25 8 45	25 17 19
28	14 34 37	17 57 39	20 0 35	28	18 19 12	25 0 9	24 23 58
29	15 36 28	22 3 0	23 25 26	29	19 17 33	23 18 1	22 4 46
30	16 38 59	24 36 24	25 13 31	30	20 11 41	S. 20 20 25	S. 18 39 18
31	17 40 29	S. 25 30 24	S. 25 22 34				

THE MOON'S RIGHT ASCENSION AND DECLINATION.

MAY, 1861.

MEAN TIME.

Day.	RIGHT ASCENSION. Midnight.	DECLINATION. Noon.	DECLINATION. Midnight.
	h. m. s.	° ′ ″	° ′ ″
1	21 1 52	S. 16 27 20	S. 14 27 2
2	21 48 49	11 56 52	9 44 36
3	22 33 29	7 3 53	S. 4 45 24
4	23 16 51	S. 2 0 14	N. 0 19 42
5	23 59 52	N. 3 4 3	5 21 14
6	0 43 24	7 59 53	10 10 7
7	1 28 15	12 37 58	14 36 48
8	2 15 1	16 48 20	18 30 52
9	3 4 4	20 20 3	21 41 0
10	3 55 28	23 1 34	23 55 45
11	4 48 49	24 41 53	25 4 52
12	5 43 19	25 12 11	25 1 7
13	6 38 3	24 27 29	23 41 44
14	7 32 6	22 27 46	21 9 0
15	8 25 1	19 17 51	17 29 35
16	9 16 44	15 6 18	12 53 24
17	10 7 41	10 4 21	7 32 39
18	10 58 37	N. 4 25 13	N. 1 41 30
19	11 50 31	S. 1 35 36	S. 4 23 19
20	12 44 25	7 39 44	10 21 50
21	13 41 14	13 25 8	15 50 19
22	14 41 25	18 26 26	20 22 30
23	15 44 35	22 17 19	23 33 13
24	16 49 16	24 35 36	25 4 17
25	17 53 19	25 9 29	24 50 17
26	18 54 35	24 1 26	22 59 54
27	19 51 47	21 26 12	19 51 37
28	20 44 39	17 44 50	15 47 10
29	21 33 42	13 18 32	11 6 35
30	22 19 50	8 25 25	6 6 7
31	23 4 4	S. 3 19 39	S. 0 58 26

JUNE, 1861.

MEAN TIME.

Day.	RIGHT ASCENSION. Midnight.	DECLINATION. Noon.	DECLINATION. Midnight.
	h. m. s.	° ′ ″	° ′ ″
1	23 47 27	N. 1 47 36	N. 4 6 22
2	0 30 57	6 47 7	8 59 26
3	1 15 26	11 30 12	13 32 0
4	2 1 39	15 47 47	17 34 35
5	2 50 10	19 29 43	20 56 30
6	3 41 10	22 24 50	23 26 14
7	4 34 26	24 21 32	24 52 36
8	5 29 15	25 9 36	25 6 39
9	6 24 36	24 42 14	24 3 52
10	7 19 25	22 57 57	21 45 26
11	8 12 57	20 1 3	18 18 3
12	9 4 59	16 0 39	13 52 33
13	9 55 45	11 9 6	8 42 12
14	10 45 53	N. 5 40 30	N. 3 1 39
15	11 36 21	S. 0 9 52	S. 2 53 16
16	12 28 8	6 5 26	8 45 7
17	13 22 17	11 47 32	14 14 9
18	14 19 33	16 55 4	18 58 10
19	15 20 5	21 4 58	22 34 1
20	16 23 7	23 54 58	24 41 17
21	17 26 57	25 8 31	25 7 58
22	18 29 26	24 40 3	23 54 31
23	19 28 46	22 37 3	21 13 38
24	20 24 4	19 16 56	17 25 20
25	21 15 24	15 1 14	12 51 11
26	22 3 24	10 10 30	7 50 24
27	22 48 59	S. 5 1 58	S. 2 38 26
28	23 33 10	N. 0 10 50	N. 2 32 38
29	0 16 57	5 17 13	7 33 0
30	1 1 16	N. 10 8 8	N. 12 13 56

THE MOON'S RIGHT ASCENSION AND DECLINATION.

JULY, 1861.				AUGUST, 1861.			
MEAN TIME.				MEAN TIME.			
RIGHT ASCENSION.		DECLINATION.		RIGHT ASCENSION.		DECLINATION.	
Day.	Midnight.	Noon.	Midnight.	Day.	Midnight.	Noon.	Midnight.
	h. m. s.	° ′ ″	° ′ ″		h. m. s.	° ′ ″	° ′ ″
1	1 46 56	N.14 34 55	N.16 26 40	1	4 52 40	N.24 45 10	N.25 4 52
2	2 34 39	18 28 25	20 1 34	2	5 47 51	25 8 3	24 53 7
3	3 24 48	21 38 26	22 47 58	3	6 43 41	24 14 11	23 23 11
4	4 17 25	23 53 52	24 34 41	4	7 39 14	22 1 56	20 36 3
5	5 12 3	25 3 52	25 11 31	5	8 33 48	18 35 31	16 38 41
6	6 7 47	24 59 39	24 31 33	6	9 27 6	14 4 57	11 43 23
7	7 3 32	23 37 0	22 33 9	7	10 19 23	8 44 52	6 6 24
8	7 58 20	20 57 38	19 20 53	8	11 11 11	N. 2 53 4	N. 0 6 35
9	8 51 40	17 9 19	15 4 56	9	12 3 19	S. 3 10 42	S. 5 55 48
10	9 43 32	12 24 35	9 59 22	10	12 56 39	9 5 48	11 39 55
11	10 34 21	6 58 49	N. 4 20 24	11	13 51 54	14 31 17	16 44 53
12	11 24 55	N. 1 8 57	S. 1 34 37	12	14 49 29	19 6 35	20 50 43
13	12 16 11	S. 4 47 17	7 27 41	13	15 49 14	22 32 51	23 39 58
14	13 9 5	10 31 29	12 59 56	14	16 50 14	24 35 1	25 0 18
15	14 4 28	15 44 11	17 51 27	15	17 51 4	25 4 44	24 47 14
16	15 2 42	20 5 10	21 41 58	16	18 50 13	24 2 25	23 5 18
17	16 3 29	23 14 36	24 12 50	17	19 46 34	21 37 6	20 6 48
18	17 5 39	24 56 16	25 10 47	18	20 39 39	18 3 59	16 8 30
19	18 7 28	25 1 31	24 31 49	19	21 29 38	13 40 51	11 28 26
20	19 7 10	23 32 14	22 22 43	20	22 17 3	8 45 23	6 23 36
21	20 3 34	20 40 24	18 58 56	21	23 2 40	S. 3 33 32	S. 1 8 59
22	20 56 20	16 44 18	14 40 8	22	23 47 20	N. 1 40 54	N. 4 2 35
23	21 45 47	12 4 1	9 46 0	23	0 31 49	6 46 8	9 0 5
24	22 32 36	6 58 10	S. 4 33 51	24	1 16 55	11 31 49	13 33 35
25	23 17 41	S. 1 42 26	N. 0 42 0	25	2 3 16	15 48 25	17 33 47
26	0 1 59	N. 3 30 28	5 50 1	26	2 51 24	19 26 42	20 51 23
27	0 46 21	8 30 4	10 40 24	27	3 41 36	22 17 20	23 17 3
28	1 31 39	13 7 9	15 4 12	28	4 33 48	24 11 0	24 41 39
29	2 18 34	17 12 49	18 52 23	29	5 27 40	24 59 7	24 57 17
30	3 7 38	20 37 45	21 55 21	30	6 22 29	24 34 54	23 58 32
31	3 59 3	N.23 11 57	N.24 2 51	31	7 17 31	N.22 54 55	N.21 43 51

THE MOON'S RIGHT ASCENSION AND DECLINATION.

SEPTEMBER, 1861.

MEAN TIME.

Day.	Right Ascension. Midnight.	Declination. Noon.	Declination. Midnight.
	h. m. s.	° ′ ″	° ′ ″
1	8 12 7	N.20 0 9	N.18 16 31
2	9 5 57	15 56 36	13 44 48
3	9 59 5	10 55 11	8 21 45
4	10 51 57	N. 5 11 19	N. 2 24 40
5	11 45 14	S. 0 55 44	S. 3 45 44
6	12 39 41	7 3 49	9 46 20
7	13 35 58	12 49 1	15 12 59
8	14 34 27	17 47 27	19 42 32
9	15 34 53	21 37 31	22 55 19
10	16 36 23	24 2 41	24 38 7
11	17 37 32	24 54 17	24 46 31
12	18 36 51	24 13 1	23 25 20
13	19 33 17	22 8 2	20 46 41
14	20 26 25	18 54 1	17 6 38
15	21 16 26	14 47 48	12 42 3
16	22 3 54	10 5 50	7 48 51
17	22 49 33	S. 5 3 10	S. 2 41 14
18	23 34 12	N. 0 6 51	N. 2 28 6
19	0 18 38	5 12 19	7 27 47
20	1 3 32	10 2 20	12 7 16
21	1 49 32	14 26 40	16 16 33
22	2 37 6	18 15 30	19 45 54
23	3 26 27	21 19 18	22 26 0
24	4 17 35	23 29 3	24 8 13
25	5 10 10	24 36 48	24 45 21
26	6 3 39	24 36 24	24 12 26
27	6 57 23	23 24 33	22 27 37
28	7 50 51	21 1 17	19 32 37
29	8 43 47	17 30 16	15 32 47
30	9 36 17	N.12 58 52	N.10 37 11

OCTOBER, 1861.

MEAN TIME.

Day.	Right Ascension. Midnight.	Declination. Noon.	Declination. Midnight.
	h. m. s.	° ′ ″	° ′ ″
1	10 28 45	N. 7 38 11	N. 4 58 44
2	11 21 53	N. 1 43 23	S. 1 5 28
3	12 16 27	S. 4 26 4	7 13 57
4	13 13 13	10 26 31	13 1 31
5	14 12 36	15 51 29	18 1 11
6	15 14 28	20 14 25	21 47 49
7	16 17 47	23 13 6	24 2 48
8	17 20 57	24 34 19	24 38 9
9	18 22 9	24 16 41	23 37 52
10	19 20 6	22 29 43	21 15 10
11	20 14 18	19 29 43	17 47 53
12	21 4 56	15 35 7	13 34 9
13	21 52 40	11 3 11	8 50 15
14	22 38 20	6 8 52	S. 3 50 3
15	23 22 50	S. 1 4 54	N. 1 14 31
16	0 6 59	N. 3 57 29	6 12 43
17	0 51 34	8 47 58	10 54 21
18	1 37 13	13 16 26	15 9 22
19	2 24 23	17 12 48	18 47 39
20	3 13 20	20 27 2	21 39 20
21	4 3 58	22 49 38	23 35 23
22	4 55 57	24 12 18	24 28 26
23	5 48 40	24 29 6	24 13 50
24	6 41 28	23 37 4	22 50 14
25	7 33 48	21 36 43	20 19 38
26	8 25 24	18 31 46	16 47 4
27	9 16 23	14 28 36	12 20 1
28	10 7 11	9 36 1	7 8 23
29	10 58 32	N. 4 5 20	N. 1 24 54
30	11 51 19	S. 1 48 48	S. 4 33 59
31	12 46 30	S. 7 47 35	S.10 27 16

THE MOON'S RIGHT ASCENSION AND DECLINATION.

NOVEMBER, 1861.				DECEMBER, 1861.			
MEAN TIME.				MEAN TIME.			
RIGHT ASCENSION.		DECLINATION.		RIGHT ASCENSION.		DECLINATION.	
Day.	Midnight.	Noon.	Midnight.	Day.	Midnight.	Noon.	Midnight.
	h. m. s.	° ′ ″	° ′ ″		h. m. s.	° ′ ″	° ′ ″
1	13 44 49	S. 13 27 21	S. 15 49 16	1	16 25 30	S. 23 16 38	S. 24 0 13
2	14 46 31	18 20 40	20 11 53	2	17 31 31	24 22 48	24 17 17
3	15 50 56	21 59 57	23 9 22	3	18 35 42	23 42 35	22 50 55
4	16 56 23	24 3 33	24 25 5	4	19 36 13	21 26 11	19 57 1
5	18 0 38	24 22 5	23 56 25	5	20 32 17	17 54 19	15 58 32
6	19 1 45	23 0 51	21 54 33	6	21 24 10	13 30 44	11 18 40
7	19 58 42	20 16 24	18 39 3	7	22 12 38	8 36 53	6 16 56
8	20 51 26	16 30 3	14 31 20	8	22 58 44	S. 3 29 53	S. 1 8 30
9	21 40 34	12 2 18	9 50 37	9	23 43 31	N. 1 37 8	N. 3 54 59
10	22 27 2	7 10 25	S. 4 52 26	10	0 27 58	6 33 55	8 44 3
11	23 11 50	S. 2 8 8	N. 0 10 46	11	1 12 58	11 11 33	13 10 5
12	23 55 56	N. 2 53 25	5 8 42	12	1 59 14	15 21 30	17 4 22
13	0 40 13	7 44 32	9 51 58	13	2 47 15	18 54 48	20 17 45
14	1 25 26	12 16 0	14 11 16	14	3 37 13	21 42 2	22 40 41
15	2 12 9	16 18 20	17 56 59	15	4 28 58	23 33 50	24 4 14
16	3 0 43	19 41 41	20 59 7	16	5 21 56	24 22 6	24 21 26
17	3 51 8	22 16 7	23 7 59	17	6 15 17	24 1 41	23 28 55
18	4 43 3	23 52 31	24 15 18	18	7 8 9	22 31 34	21 27 47
19	5 35 49	24 23 58	24 15 33	19	7 59 57	19 55 20	18 23 34
20	6 28 37	23 46 54	23 7 0	20	8 50 25	16 20 27	14 25 5
21	7 20 46	22 1 49	20 51 59	21	9 39 46	11 57 4	9 43 16
22	8 11 53	19 13 1	17 36 14	22	10 28 32	6 56 45	N. 4 30 11
23	9 1 57	15 27 38	13 27 51	23	11 17 30	N. 1 32 7	S. 1 1 7
24	9 51 20	10 54 45	8 36 36	24	12 7 40	S. 4 3 11	6 36 17
25	10 40 43	5 44 49	N. 3 13 38	25	13 0 3	9 33 40	11 58 40
26	11 31 2	N. 0 9 58	S. 2 27 56	26	13 55 34	14 41 8	16 48 38
27	12 23 18	S. 5 35 10	8 11 59	27	14 54 43	19 4 19	20 43 49
28	13 18 33	11 12 25	13 38 18	28	15 57 15	22 20 10	23 21 26
29	14 17 28	16 19 7	18 22 22	29	17 1 54	24 7 40	24 23 26
30	15 20 8	S. 20 29 8	S. 21 57 32	30	18 6 34	24 13 57	23 42 32
				31	19 9 3	S. 22 39 13	S. 21 25 20

1861. JANUARY. 1861.

AT GREENWICH MEAN NOON.

THE MOON'S

Day of the Week.	Day of the Month.	Longitude. Noon.	Longitude. Midnight.	Latitude. Noon.	Latitude. Midnight.	Age. Noon.	Meridian Passage.
		° ′ ″	° ′ ″	° ′ ″	° ′ ″	d.	h. m.
Tues.	1	157 9 56	164 14 58	S.3 41 44	S.4 7 55	20·0	16 17·6
Wed.	2	171 20 41	178 26 43	4 30 21	4 48 39	21·0	17 6·3
Thur.	3	185 32 48	192 38 39	5 2 32	5 11 47	22·0	17 56·0
Fri.	4	199 43 59	206 48 31	5 16 17	5 15 58	23·0	18 47·7
Sat.	5	213 52 2	220 54 13	5 10 53	5 1 8	24·0	19 42·2
Sun.	6	227 54 50	234 53 35	4 46 56	4 28 32	25·0	20 39·4
Mon.	7	241 50 13	248 44 27	4 6 16	3 40 32	26·0	21 38·3
Tues.	8	255 36 0	262 24 37	3 11 46	2 40 29	27·0	22 37·1
Wed.	9	269 10 4	275 52 5	2 7 9	1 32 20	28·0	23 33·8
Thur.	10	282 30 32	289 5 12	S.0 56 34	S.0 20 22	29·0	♂
Fri.	11	295 36 1	302 2 54	N.0 15 44	N.0 51 17	0·4	0 27·1
Sat.	12	308 25 52	314 44 56	1 25 50	1 58 58	1·4	1 16·5
Sun.	13	321 0 14	327 11 57	2 30 19	2 59 36	2·4	2 2·2
Mon.	14	333 20 18	339 25 36	3 26 31	3 50 51	3·4	2 45·0
Tues.	15	345 28 11	351 28 28	4 12 25	4 31 4	4·4	3 25·9
Wed.	16	357 26 52	3 23 55	4 46 40	4 59 6	5·4	4 6·1
Thur.	17	9 20 5	15 15 57	5 8 19	5 14 14	6·4	4 46·5
Fri.	18	21 12 5	27 9 4	5 16 48	5 15 59	7·4	5 28·1
Sat.	19	33 7 29	39 7 56	5 11 45	5 4 7	8·4	6 12·0
Sun.	20	45 11 1	51 17 17	4 53 3	4 38 35	9·4	6 58·9
Mon.	21	57 27 16	63 41 30	4 20 46	3 59 42	10·4	7 49·3
Tues.	22	70 0 24	76 24 22	3 35 28	3 8 13	11·4	8 43·0
Wed.	23	82 53 44	89 28 41	2 38 11	2 5 39	12·4	9 39·1
Thur.	24	96 9 21	102 55 44	1 30 56	N.0 54 28	13·4	10 36·3
Fri.	25	109 47 44	116 45 6	N.0 16 43	S.0 21 45	14·4	11 32·8
Sat.	26	123 47 27	130 54 18	S.1 0 19	1 38 22	15·4	12 27·6
Sun.	27	138 5 3	145 19 1	2 15 10	2 50 4	16·4	13 20·3
Mon.	28	152 35 25	159 53 27	3 22 22	3 51 29	17·4	14 11·5
Tues.	29	167 12 17	174 31 5	4 16 51	4 38 1	18·4	15 1·8
Wed.	30	181 49 7	189 5 38	4 54 37	5 6 24	19·4	15 52·5
Thur.	31	196 20 2	203 31 47	5 13 14	5 15 6	20·4	16 44·4
Fri.	32	210 40 27	217 45 43	S.5 12 4	S.5 4 17	21·4	17 38·4

1861. FEBRUARY. 1861.

AT GREENWICH MEAN TIME.

THE MOON'S

Day of the Week.	Day of the Month.	Longitude. Noon.	Longitude. Midnight.	Latitude. Noon.	Latitude. Midnight.	Age. Noon.	Meridian Passage.
		° ′ ″	° ′ ″	° ′ ″	° ′ ″	d.	h. m.
Fri.	1	210 40 27	217 45 43	S. 5 12 4	S. 5 4 17	21·4	17 38·4
Sat.	2	224 47 22	231 45 15	4 51 59	4 35 28	22·4	18 34·5
Sun.	3	238 39 18	245 29 31	4 15 6	3 51 17	23·4	19 32·2
Mon.	4	252 15 58	258 58 43	3 24 25	2 54 59	24·4	20 30·1
Tues.	5	265 37 54	272 13 38	2 23 25	1 50 14	25·4	21 26·5
Wed.	6	278 46 2	285 15 14	1 15 52	S. 0 40 50	26·4	22 20·0
Thur.	7	291 41 21	298 4 28	S. 0 5 34	N. 0 29 27	27·4	23 10·0
Fri.	8	304 24 43	310 42 10	N. 1 3 49	1 37 7	28·4	23 56·6
Sat.	9	316 56 54	323 9 0	2 8 58	2 39 2	29·4	☌
Sun.	10	329 18 34	335 25 43	3 7 0	3 32 36	0·7	0 40·3
Mon.	11	341 30 35	347 33 19	3 55 34	4 15 45	1·7	1 21·9
Tues.	12	353 34 8	359 33 15	4 32 58	4 47 5	2·7	2 2·5
Wed.	13	5 30 58	11 27 34	4 58 0	5 5 41	3·7	2 42·8
Thur.	14	17 23 27	23 19 1	5 10 3	5 11 5	4·7	3 23·8
Fri.	15	29 14 42	35 11 1	5 8 48	5 3 12	5·7	4 6·5
Sat.	16	41 8 28	47 7 37	4 54 19	4 42 10	6·7	4 51·6
Sun.	17	53 9 3	59 13 22	4 26 51	4 8 25	7·7	5 39·6
Mon.	18	65 21 11	71 33 5	3 46 58	3 22 39	8·7	6 30·7
Tues.	19	77 49 40	84 11 30	2 55 35	2 25 59	9·7	7 24·5
Wed.	20	90 39 7	97 12 56	1 54 7	1 20 14	10·7	8 19·9
Thur.	21	103 53 19	110 40 32	N. 0 44 44	N. 0 8 2	11·7	9 15·9
Fri.	22	117 34 41	124 35 42	S. 0 29 22	S. 1 6 55	12·7	10 11·2
Sat.	23	131 43 23	138 57 18	1 43 58	2 19 50	13·7	11 5·2
Sun.	24	146 16 50	153 41 10	2 53 50	3 25 15	14·7	11 58·0
Mon.	25	161 9 21	168 40 16	3 53 23	4 17 38	15·7	12 50·1
Tues.	26	176 12 41	183 45 21	4 37 28	4 52 28	16·7	13 42·4
Wed.	27	191 17 3	198 46 36	5 2 21	5 6 59	17·7	14 35·8
Thur.	28	206 12 57	213 35 12	5 6 25	5 0 44	18·7	15 31·1
Fri.	29	220 52 38	228 4 42	S. 4 50 12	S. 4 35 12	19·7	16 28·3

1861. MARCH. 1861.

AT GREENWICH MEAN TIME.

Day of the Week.	Day of the Month.	THE MOON'S Longitude. Noon.	Longitude. Midnight.	Latitude. Noon.	Latitude. Midnight.	Age. Noon.	Meridian Passage.
		° ′ ″	° ′ ″	° ′ ″	° ′ ″	d.	h. m.
Fri.	1	220 52 38	228 4 42	S. 4 50 12	S. 4 35 12	19·7	16 28·3
Sat.	2	235 11 4	242 11 32	4 16 7	3 53 25	20·7	17 26·9
Sun.	3	249 6 6	255 54 52	3 27 35	2 59 9	21·7	18 25·5
Mon.	4	262 38 2	269 15 55	2 28 36	1 56 26	22·7	19 22·5
Tues.	5	275 48 52	282 17 15	1 23 8	S. 0 49 9	23·7	20 16·5
Wed.	6	288 41 28	295 1 56	S. 0 14 56	N. 0 19 6	24·7	21 7·0
Thur.	7	301 19 3	307 33 8	N. 0 52 34	1 25 6	25·7	21 54·0
Fri.	8	313 44 34	319 53 36	1 56 20	2 25 58	26·7	22 38·1
Sat.	9	326 0 32	332 5 34	2 53 42	3 19 15	27·7	23 20·0
Sun.	10	338 8 54	344 10 44	3 42 23	4 2 53	28·7	♂
Mon.	11	350 11 11	356 10 26	4 20 34	4 35 18	29·7	0 0·6
Tues.	12	2 8 38	8 5 54	4 46 56	4 55 24	0·9	0 40·9
Wed.	13	14 2 27	19 58 27	5 0 37	5 2 34	1·9	1 21·7
Thur.	14	25 54 9	31 49 48	5 1 14	4 56 39	2·9	2 3·7
Fri.	15	37 45 42	43 42 13	4 48 52	4 37 55	3·9	2 47·8
Sat.	16	49 39 44	55 38 41	4 23 55	4 6 57	4·9	3 34·4
Sun.	17	61 39 34	67 42 54	3 47 8	3 24 38	5·9	4 23·6
Mon.	18	73 49 15	79 59 12	2 59 36	2 32 13	6·9	5 15·2
Tues.	19	86 13 21	92 32 19	2 2 42	1 31 18	7·9	6 8·5
Wed.	20	98 56 41	105 27 2	N. 0 58 18	N. 0 24 4	8·9	7 2·5
Thur.	21	112 3 53	118 47 40	S. 0 11 3	S. 0 46 36	9·9	7 56·4
Fri.	22	125 38 43	132 37 12	1 22 6	1 56 58	10·9	8 49·5
Sat.	23	139 43 9	146 56 22	2 30 37	3 2 24	11·9	9 41·8
Sun.	24	154 16 28	161 42 45	3 31 38	3 57 41	12·9	10 33·8
Mon.	25	169 14 22	176 50 11	4 19 53	4 37 41	13·9	11 26·1
Tues.	26	184 28 56	192 9 10	4 50 38	4 58 23	14·9	12 19·9
Wed.	27	199 49 23	207 28 9	5 0 45	4 57 44	15·9	13 15·9
Thur.	28	215 4 1	222 35 45	4 49 26	4 36 10	16·9	14 14·5
Fri.	29	230 2 16	237 22 45	4 18 20	3 56 25	17·9	15 15·0
Sat.	30	244 36 34	251 43 22	3 30 59	3 2 37	18·9	16 15·9
Sun.	31	258 42 59	265 35 28	2 31 57	1 59 33	19·9	17 15·5
Mon.	32	272 21 1	278 59 56	S. 1 25 58	S. 0 51 44	20·9	18 11·8

1861. APRIL. 1861.

AT GREENWICH MEAN TIME.

THE MOON'S

Day of the Week.	Day of the Month.	Longitude. Noon.	Longitude. Midnight.	Latitude. Noon.	Latitude. Midnight.	Age. Noon.	Meridian Passage.
		° ′ ″	° ′ ″	° ′ ″	° ′ ″	d.	h. m.
Mon.	1	272 21 1	278 59 56	S. 1 25 58	S. 0 51 44	20·9	18 11·8
Tues.	2	285 32 41	291 59 43	S. 0 17 21	N. 0 16 45	21·9	19 4·1
Wed.	3	298 21 36	304 38 52	N. 0 50 12	1 22 36	22·9	19 52·3
Thur.	4	310 52 4	317 1 44	1 53 39	2 23 2	23·9	20 37·1
Fri.	5	323 8 23	329 12 30	2 50 29	3 15 46	24·9	21 19·4
Sat.	6	335 14 31	341 14 50	3 38 41	3 59 1	25·9	22 0·1
Sun.	7	347 13 46	353 11 40	4 16 36	4 31 18	26·9	22 40·3
Mon.	8	359 8 45	5 5 17	4 42 59	4 51 33	27·9	23 20·8
Tues.	9	11 1 28	16 57 28	4 56 56	4 59 4	28·9	♂
Wed.	10	22 53 26	28 49 34	4 57 58	4 53 37	0·2	0 2·4
Thur.	11	34 46 0	40 42 55	4 46 4	4 35 22	1·2	0 45·9
Fri.	12	46 40 31	52 39 1	4 21 38	4 4 57	2·2	1 31·7
Sat.	13	58 38 41	64 39 50	3 45 29	3 23 23	3·2	2 20·1
Sun.	14	70 42 47	76 47 56	2 58 52	2 32 7	4·2	3 10·6
Mon.	15	82 55 42	89 6 33	2 3 23	1 32 56	5·2	4 2·8
Tues.	16	95 21 1	101 39 35	N. 1 1 2	N. 0 28 2	6·2	4 55·5
Wed.	17	108 2 49	114 31 14	S. 0 5 45	S. 0 39 56	7·2	5 47·9
Thur.	18	121 5 23	127 45 41	1 14 5	1 47 46	8·2	6 39·5
Fri.	19	134 32 34	141 26 20	2 20 28	2 51 40	9·2	7 30·2
Sat.	20	148 27 8	155 34 59	3 20 48	3 47 17	10·2	8 20·4
Sun.	21	162 49 40	170 10 49	4 10 33	4 30 0	11·2	9 10·9
Mon.	22	177 37 46	185 9 41	4 45 9	4 55 32	12·2	10 2·9
Tues.	23	192 45 27	200 23 50	5 0 48	5 0 45	13·2	10 57·2
Wed.	24	208 3 26	215 42 47	4 55 18	4 44 33	14·2	11 54·8
Thur.	25	223 20 27	230 55 2	4 28 45	4 8 18	15·2	12 55·6
Fri.	26	238 25 18	245 50 10	3 43 42	3 15 33	16·2	13 58·4
Sat.	27	253 8 49	260 20 37	2 44 31	2 11 17	17·2	15 0·9
Sun.	28	267 25 12	274 22 24	1 36 31	S. 1 0 51	18·2	16 0·9
Mon.	29	281 12 14	287 54 55	S. 0 24 54	N. 0 10 47	19·2	16 56·6
Tues.	30	294 30 47	301 0 15	N. 0 45 46	1 19 36	20·2	17 47·6
Wed.	31	307 23 51	313 42 7	N. 1 51 55	N. 2 22 25	21·2	18 34·4

1861. MAY. 1861.

AT GREENWICH MEAN TIME.

Day of the Week.	Day of the Month.	THE MOON'S Longitude. Noon.	Longitude. Midnight.	Latitude. Noon.	Latitude. Midnight.	Age. Noon.	Meridian Passage.
		° ′ ″	° ′ ″	° ′ ″	° ′ ″	d.	h. m.
Wed.	1	307 23 51	313 42 7	N.1 51 55	N.2 22 25	21·2	18 34·4
Thur.	2	319 55 39	326 5 4	2 50 49	3 16 54	22·2	19 17·9
Fri.	3	332 10 56	338 13 51	3 40 27	4 1 19	23·2	19 59·3
Sat.	4	344 14 21	350 12 58	4 19 22	4 34 27	24·2	20 39·6
Sun.	5	356 10 10	2 6 25	4 46 30	4 55 23	25·2	21 19·8
Mon.	6	8 2 6	13 57 34	5 1 5	5 3 31	26·2	22 1·0
Tues.	7	19 53 8	25 49 5	5 2 42	4 58 35	27·2	22 43·9
Wed.	8	31 45 40	37 43 4	4 51 15	4 40 42	28·2	23 29·2
Thur.	9	43 41 29	49 41 6	4 27 1	4 10 20	29·2	☌
Fri.	10	55 42 5	61 44 34	3 50 47	3 28 31	0·5	0 17·0
Sat.	11	67 48 45	73 54 48	3 3 45	2 36 43	1·5	1 7·2
Sun.	12	80 2 56	86 13 23	2 7 41	1 36 55	2·5	1 59·2
Mon.	13	92 26 23	98 42 16	N.1 4 44	N.0 31 29	3·5	2 51·9
Tues.	14	105 1 19	111 23 55	S. 0 2 28	S. 0 36 44	4·5	3 44·2
Wed.	15	117 50 24	124 21 9	1 10 55	1 44 34	5·5	4 35·3
Thur.	16	130 56 32	137 36 53	2 17 15	2 48 29	6·5	5 25·0
Fri.	17	144 22 31	151 13 40	3 17 47	3 44 39	7·5	6 13·8
Sat.	18	158 10 29	165 13 0	4 8 35	4 29 7	8·5	7 2·3
Sun.	19	172 21 9	179 34 41	4 45 45	4 58 5	9·5	7 51·6
Mon.	20	186 53 11	194 16 3	5 5 44	5 8 24	10·5	8 43·0
Tues.	21	201 42 32	209 11 43	5 5 56	4 58 13	11·5	9 37·5
Wed.	22	216 42 34	224 13 55	4 45 21	4 27 32	12·5	10 35·7
Thur.	23	231 44 34	239 18 22	4 5 7	3 38 34	13·5	11 37·3
Fri.	24	246 39 10	254 0 56	3 8 26	2 35 23	14·5	12 40·8
Sat.	25	261 17 48	268 29 2	2 0 7	1 23 20	15·5	13 43·4
Sun.	26	275 34 5	282 32 37	S. 0 45 44	S. 0 7 59	16·5	14 42·7
Mon.	27	289 24 26	296 9 33	N.0 29 18	N.1 5 37	17·5	15 37·4
Tues.	28	302 48 4	309 20 17	1 40 27	2 13 26	18·5	16 27·3
Wed.	29	315 46 30	322 7 13	2 44 13	3 12 31	19·5	17 13·2
Thur.	30	328 22 54	334 34 7	3 38 8	4 0 53	20·5	17 56·1
Fri.	31	340 41 25	346 45 23	4 20 37	4 37 14	21·5	18 37·2
Sat.	32	352 46 37	358 45 41	N.4 50 40	N.5 0 50	22·5	19 17·7

1861. JUNE. 1861.

AT GREENWICH MEAN TIME.

THE MOON'S

Day of the Week.	Day of the Month.	Longitude. *Noon.*	Longitude. *Midnight.*	Latitude. *Noon.*	Latitude. *Midnight.*	Age. *Noon.*	Meridian Passage.
		° ′ ″	° ′ ″	° ′ ″	° ′ ″	d.	h. m.
Sat.	1	352 46 37	358 45 41	N.4 50 40	N.5 0 50	22·5	19 17·7
Sun.	2	4 43 8	10 39 32	5 7 42	5 11 15	23·5	19 58·6
Mon.	3	16 35 23	22 31 9	5 11 27	5 8 19	24·5	20 40·8
Tues.	4	28 27 16	34 24 10	5 1 53	4 52 10	25·5	21 25·3
Wed.	5	40 22 11	46 21 39	4 39 15	4 23 13	26·5	22 12·3
Thur.	6	52 22 52	58 26 4	4 4 11	3 42 17	27·5	23 2·1
Fri.	7	64 31 28	70 39 14	3 17 43	2 50 42	28·5	23 54·1
Sat.	8	76 49 33	83 2 31	2 21 27	1 50 18	29·5	δ
Sun.	9	89 18 16	95 36 56	1 17 33	N.0 43 35	0·9	0 47·3
Mon.	10	101 58 35	108 23 19	N.0 8 46	S. 0 26 27	1·9	1 40·4
Tues.	11	114 51 17	121 22 32	S. 1 1 40	1 36 24	2·9	2 32·4
Wed.	12	127 57 14	134 35 27	2 10 10	2 42 29	3·9	3 22·7
Thur.	13	141 17 18	148 2 53	3 12 54	3 40 54	4·9	4 11·5
Fri.	14	154 52 16	161 45 29	4 6 3	4 27 53	5·9	4 59·4
Sat.	15	168 42 30	175 43 18	4 46 0	5 0 2	6·9	5 47·3
Sun.	16	182 47 41	189 55 29	5 9 39	5 14 36	7·9	6 36·3
Mon.	17	197 6 23	204 19 59	5 14 40	5 9 47	8·9	7 27·7
Tues.	18	211 35 47	218 53 12	4 59 56	4 45 12	9·9	8 22·5
Wed.	19	226 11 35	233 30 12	4 25 49	4 2 5	10·9	9 21·0
Thur.	20	240 48 16	248 4 59	3 34 25	3 3 20	11·9	10 22·4
Fri.	21	255 19 35	262 31 19	2 29 26	1 53 21	12·9	11 24·9
Sat.	22	269 39 28	276 43 27	S. 1 15 46	S. 0 37 21	13·9	12 25·9
Sun.	23	283 42 45	290 36 57	N.0 1 12	N.0 39 18	14·9	13 23·3
Mon.	24	297 25 48	304 9 6	1 16 21	1 51 50	15·9	14 16·3
Tues.	25	310 46 50	317 19 2	2 25 19	2 56 25	16·9	15 4·8
Wed.	26	323 45 53	330 7 38	3 24 50	3 50 20	17·9	15 49·8
Thur.	27	336 24 36	342 37 12	4 12 42	4 31 50	18·9	16 32·4
Fri.	28	348 45 53	354 51 9	4 47 38	5 0 2	19·9	17 13·6
Sat.	29	0 53 31	6 53 34	5 9 0	5 14 32	20·9	17 54·6
Sun.	30	12 51 51	18 48 55	5 16 38	5 15 20	21·9	18 36·5
Mon.	31	24 45 22	30 41 45	N.5 10 40	N.5 2 40	22·9	19 20·0

1861. JULY. 1861.

AT GREENWICH MEAN TIME.

THE MOON'S

Day of the Week.	Day of the Month.	Longitude. Noon.	Longitude. Midnight.	Latitude. Noon.	Latitude. Midnight.	Age. Noon.	Meridian Passage.
		° ′ ″	° ′ ″	° ′ ″	° ′ ″	d.	h. m.
Mon.	1	24 45 22	30 41 45	N.5 10 40	N.5 2 40	22·9	19 20·0
Tues.	2	36 38 36	42 36 27	4 51 25	4 37 0	23·9	20 6·0
Wed.	3	48 35 47	54 37 5	4 19 30	3 59 2	24·9	20 54·7
Thur.	4	60 40 45	66 47 11	3 35 46	3 9 52	25·9	21 46·0
Fri.	5	72 56 41	79 9 34	2 41 34	2 11 4	26·9	22 39·1
Sat.	6	85 26 3	91 46 18	1 38 42	N.1 4 48	27·9	23 33·0
Sun.	7	98 10 25	104 38 29	N.0 29 44	S.0 6 3	28·9	☌
Mon.	8	111 10 29	117 46 23	S.0 42 8	1 18 1	0·4	0 26·4
Tues.	9	124 26 4	131 9 24	1 53 10	2 27 4	1·4	1 18·3
Wed.	10	137 56 13	144 46 18	2 59 10	3 28 58	2·4	2 8·5
Thur.	11	151 39 24	158 35 17	3 55 58	4 19 41	3·4	2 57·3
Fri.	12	165 33 40	172 34 16	4 39 42	4 55 39	4·4	3 45·5
Sat.	13	179 36 47	186 40 56	5 7 14	5 14 13	5·4	4 34·0
Sun.	14	193 46 25	200 52 56	5 16 26	5 13 50	6·4	5 24·1
Mon.	15	208 0 9	215 7 46	5 6 24	4 54 16	7·4	6 16·7
Tues.	16	222 15 29	229 22 55	4 37 35	4 16 37	8·4	7 12·4
Wed.	17	236 29 45	243 35 38	3 51 44	3 23 20	9·4	8 11·2
Thur.	18	250 40 10	257 42 59	2 51 54	2 17 59	10·4	9 11·8
Fri.	19	264 43 42	271 41 58	1 42 9	S.1 5 0	11·4	10 12·2
Sat.	20	278 37 24	285 29 39	S.0 27 9	N.0 10 47	12·4	11 10·3
Sun.	21	292 18 25	299 3 26	N.0 48 14	1 24 39	13·4	12 4·8
Mon.	22	305 44 27	312 21 19	1 59 30	2 32 22	14·4	12 55·3
Tues.	23	318 53 54	325 22 9	3 2 50	3 30 35	15·4	13 42·1
Wed.	24	331 46 6	338 5 51	3 55 21	4 16 56	16·4	14 26·1
Thur.	25	344 21 33	350 33 26	4 35 11	4 50 0	17·4	15 8·3
Fri.	26	356 41 48	2 47 0	5 1 20	5 9 9	18·4	15 49·8
Sat.	27	8 49 29	14 49 40	5 13 28	5 14 19	19·4	16 31·5
Sun.	28	20 48 4	26 45 14	5 11 46	5 5 51	20·4	17 14·4
Mon.	29	32 41 41	38 38 2	4 56 41	4 44 20	21·4	17 59·2
Tues.	30	44 34 52	50 32 47	4 28 55	4 10 32	22·4	18 46·4
Wed.	31	56 32 21	62 34 11	3 49 21	3 25 30	23·4	19 36·2
Thur.	32	68 38 48	74 46 47	N.2 59 9	N.2 30 32	24·4	20 28·3

1861. AUGUST. 1861.

AT GREENWICH MEAN TIME.

THE MOON'S

Day of the Week.	Day of the Month.	Longitude. Noon.	Longitude. Midnight.	Latitude. Noon.	Latitude. Midnight.	Age. Noon.	Meridian Passage.
		° ′ ″	° ′ ″	° ′ ″	° ′ ″	d.	h. m.
Thur.	1	68 38 48	74 46 47	N.2 59 9	N.2 30 32	24·4	20 28·3
Fri.	2	80 58 35	87 14 39	1 59 51	1 27 23	25·4	21 21·9
Sat.	3	93 35 21	100 1 0	N.0 53 29	N.0 18 28	26·4	22 15·7
Sun.	4	106 31 48	113 7 52	S.0 17 12	S.0 53 6	27·4	23 8·8
Mon.	5	119 49 13	126 35 44	1 28 44	2 3 31	28·4	☌
Tues.	6	133 27 12	140 23 19	2 36 56	3 8 22	29·4	0 0·6
Wed.	7	147 23 37	154 27 37	3 37 16	4 3 5	1·0	0 51·1
Thur.	8	161 34 42	168 44 12	4 25 18	4 43 30	2·0	1 40·7
Fri.	9	175 55 28	183 7 49	4 57 18	5 6 26	3·0	2 30·4
Sat.	10	190 20 33	197 33 5	5 10 43	5 10 6	4·0	3 20·9
Sun.	11	204 44 49	211 55 18	5 4 36	4 54 21	5·0	4 13·3
Mon.	12	219 4 5	226 10 51	4 39 33	4 20 30	6·0	5 8·3
Tues.	13	233 15 19	240 17 19	3 57 34	3 31 10	7·0	6 5·8
Wed.	14	247 16 42	254 13 23	3 1 47	2 29 53	8·0	7 5·0
Thur.	15	261 7 18	267 58 25	1 56 0	1 20 42	9·0	8 4·4
Fri.	16	274 46 43	281 32 11	S.0 44 29	S.0 7 56	10·0	9 2·1
Sat.	17	288 14 46	294 54 28	N.0 28 26	N.1 4 7	11·0	9 56·9
Sun.	18	301 31 13	308 4 58	1 38 38	2 11 31	12·0	10 48·0
Mon.	19	314 35 40	321 3 16	2 42 24	3 10 53	13·0	11 35·6
Tues.	20	327 27 42	333 48 56	3 36 41	3 59 32	14·0	12 20·5
Wed.	21	340 6 59	346 21 51	4 19 15	4 35 38	15·0	13 3·4
Thur.	22	352 33 38	358 42 25	4 48 37	4 58 8	16·0	13 45·2
Fri.	23	4 48 22	10 51 44	5 4 10	5 6 43	17·0	14 27·0
Sat.	24	16 52 47	22 51 51	5 5 51	5 1 37	18·0	15 9·5
Sun.	25	28 49 19	34 45 37	4 54 8	4 43 29	19·0	15 53·4
Mon.	26	40 41 16	46 36 47	4 29 49	4 13 15	20·0	16 39·4
Tues.	27	52 32 43	58 29 40	3 53 56	3 32 1	21·0	17 27·6
Wed.	28	64 28 16	70 29 10	3 7 41	2 41 7	22·0	18 18·1
Thur.	29	76 32 58	82 40 21	2 12 32	1 42 9	23·0	19 10·1
Fri.	30	88 51 55	95 8 16	1 10 14	N.0 37 4	24·0	20 3·0
Sat.	31	101 29 56	107 57 23	N.0 3 1	S.0 31 33	25·0	20 55·9
Sun.	32	114 31 2	121 11 8	S.1 6 13	S.1 40 31	26·0	21 48·1

1861. SEPTEMBER. 1861.

AT GREENWICH MEAN TIME.

THE MOON'S

Day of the Week.	Day of the Month.	Longitude. Noon.	Longitude. Midnight.	Latitude. Noon.	Latitude. Midnight.	Age. Noon.	Meridian Passage.
		° ′ ″	° ′ ″	° ′ ″	° ′ ″	d.	h. m.
Sun.	1	114 31 2	121 11 8	S. 1 6 13	S. 1 40 31	26·0	21 48·1
Mon.	2	127 57 49	134 51 6	2 13 56	2 45 53	27·0	22 39·4
Tues.	3	141 50 48	148 56 32	3 15 48	3 43 6	28·0	23 30·2
Wed.	4	156 7 47	163 23 51	4 7 12	4 27 33	29·0	☌
Thur.	5	170 43 52	178 6 50	4 43 40	4 55 10	0·6	0 20·9
Fri.	6	185 31 43	192 57 24	5 1 46	5 3 17	1·6	1 12·6
Sat.	7	200 22 50	207 46 58	4 59 41	4 51 4	2·6	2 6·0
Sun.	8	215 8 54	222 27 52	4 37 39	4 19 46	3·6	3 1·7
Mon.	9	229 43 12	236 54 27	3 57 49	3 32 16	4·6	3 59·8
Tues.	10	244 1 17	251 3 32	3 3 40	2 32 32	5·6	4 59·6
Wed.	11	258 1 9	264 54 9	1 59 28	1 25 0	6·6	5 59·4
Thur.	12	271 42 42	278 26 59	S. 0 49 41	S. 0 14 3	7·6	6 57·6
Fri.	13	285 7 13	291 43 40	N. 0 21 23	N. 0 56 11	8·6	7 52·7
Sat.	14	298 16 33	304 46 7	1 29 54	2 2 7	9·6	8 44·2
Sun.	15	311 12 36	317 36 10	2 32 28	3 0 37	10·6	9 32·1
Mon.	16	323 57 0	330 15 13	3 26 16	3 49 10	11·6	10 17·2
Tues.	17	336 30 55	342 44 12	4 9 7	4 25 55	12·6	11 0·3
Wed.	18	348 55 9	355 3 48	4 39 28	4 49 39	13·6	11 42·2
Thur.	19	1 10 14	7 14 33	4 56 25	4 59 46	14·6	12 23·9
Fri.	20	13 16 51	19 17 17	4 59 43	4 56 20	15·6	13 6·0
Sat.	21	25 16 1	31 13 17	4 49 41	4 39 53	16·6	13 49·5
Sun.	22	37 9 21	43 4 32	4 27 3	4 11 22	17·6	14 34·6
Mon.	23	48 59 14	54 53 52	3 52 58	3 32 3	18·6	15 21·7
Tues.	24	60 48 55	66 44 53	3 8 48	2 43 25	19·6	16 10·8
Wed.	25	72 42 22	78 41 57	2 16 7	1 47 8	20·6	17 1·4
Thur.	26	84 44 18	90 50 2	1 16 42	N. 0 45 6	21·6	17 52·8
Fri.	27	96 59 50	103 14 22	N. 0 12 38	S. 0 20 23	22·6	18 44·3
Sat.	28	109 34 17	116 0 0	S. 0 53 38	1 26 43	23·6	19 35·5
Sun.	29	122 32 33	129 11 55	1 59 11	2 30 36	24·6	20 26·0
Mon.	30	135 58 33	142 52 40	3 0 25	3 28 9	25·6	21 16·2
Tues.	31	149 54 15	157 3 6	S. 3 53 12	S. 4 15 1	26·6	22 6·6

1861. OCTOBER. 1861.

AT GREENWICH MEAN TIME.

THE MOON'S

Day of the Week.	Day of the Month.	Longitude. Noon.	Longitude. Midnight.	Latitude. Noon.	Latitude. Midnight.	Age. Noon.	Meridian Passage.
		° ′ ″	° ′ ″	° ′ ″	° ′ ″	d.	h. m.
Tues.	1	149 54 15	157 3 6	S. 3 53 12	S. 4 15 1	26·6	22 6·6
Wed.	2	164 18 47	171 40 39	4 33 5	4 46 51	27·6	22 58·1
Thur.	3	179 7 49	186 39 11	4 55 56	4 59 59	28·6	23 51·6
Fri.	4	194 13 32	201 49 31	4 58 49	4 52 21	0·2	☌
Sat.	5	209 25 43	217 0 48	4 40 42	4 24 7	1·2	0 47·9
Sun.	6	224 33 29	232 2 37	4 2 59	3 37 47	2·2	1 47·1
Mon.	7	239 27 17	246 46 42	3 9 6	2 37 35	3·2	2 48·6
Tues.	8	254 0 22	261 7 57	2 3 54	1 28 41	4·2	3 50·6
Wed.	9	268 9 19	275 4 29	S. 0 52 36	S. 0 16 15	5·2	4 51·1
Thur.	10	281 53 37	288 36 59	N. 0 19 50	N. 0 55 8	6·2	5 48·3
Fri.	11	295 14 55	301 47 48	1 29 12	2 1 39	7·2	6 41·3
Sat.	12	308 16 3	314 40 5	2 32 7	3 0 18	8·2	7 30·3
Sun.	13	321 0 20	327 17 11	3 25 58	3 48 51	9·2	8 15·9
Mon.	14	333 30 59	339 42 5	4 8 47	4 25 38	10·2	8 59·2
Tues.	15	345 50 47	351 57 20	4 39 16	4 49 35	11·2	9 41·0
Wed.	16	358 1 58	4 4 52	4 56 32	5 0 7	12·2	10 22·4
Thur.	17	10 6 13	16 6 9	5 0 19	4 57 10	13·2	11 4·1
Fri.	18	22 4 51	28 2 26	4 50 45	4 41 9	14·2	11 47·0
Sat.	19	33 59 4	39 54 56	4 28 30	4 12 56	15·2	12 31·6
Sun.	20	45 50 11	51 45 7	3 54 38	3 33 47	16·2	13 18·1
Mon.	21	57 39 56	63 34 59	3 10 35	2 45 17	17·2	14 6·5
Tues.	22	69 30 36	75 27 12	2 18 6	1 49 18	18·2	14 56·3
Wed.	23	81 25 13	87 25 8	1 19 8	N. 0 47 53	19·2	15 46·9
Thur.	24	93 27 30	99 32 53	N. 0 15 52	S. 0 16 37	20·2	16 37·4
Fri.	25	105 41 52	111 55 4	S. 0 49 17	1 21 44	21·2	17 27·3
Sat.	26	118 13 6	124 36 34	1 53 38	2 24 34	22·2	18 16·4
Sun.	27	131 6 3	137 42 3	2 54 8	3 21 51	23·2	19 4·9
Mon.	28	144 25 1	151 15 16	3 47 18	4 9 57	24·2	19 53·5
Tues.	29	158 12 58	165 18 9	4 29 20	4 44 57	25·2	20 42·9
Wed.	30	172 30 37	179 49 57	4 56 20	5 3 5	26·2	21 34·3
Thur.	31	187 15 31	194 46 25	5 4 52	5 1 26	27·2	22 28·8
Fri.	32	202 21 34	209 59 42	S. 4 52 41	S. 4 38 40	28·2	23 27·0

1861. NOVEMBER. 1861.

AT GREENWICH MEAN TIME.

THE MOON'S

Day of the Week.	Day of the Month.	Longitude. Noon.	Longitude. Midnight.	Latitude. Noon.	Latitude. Midnight.	Age. Noon.	Meridian Passage.
		° ′ ″	° ′ ″	° ′ ″	° ′ ″	d.	h. m.
Fri.	1	202 21 34	209 59 42	S. 4 52 41	S. 4 38 40	28·2	23 27·0
Sat.	2	217 39 25	225 19 16	4 19 36	3 55 49	29·2	☌
Sun.	3	232 57 49	240 33 42	3 27 50	2 56 17	0·8	0 28·8
Mon.	4	248 5 41	255 32 43	2 21 52	1 45 20	1·8	1 32·8
Tues.	5	262 53 59	270 8 53	S. 1 7 27	S. 0 28 58	2·8	2 36·6
Wed.	6	277 16 59	284 18 9	N. 0 9 24	N. 0 47 3	3·8	3 37·6
Thur.	7	291 12 20	297 59 43	1 23 25	1 58 0	4·8	4 34·1
Fri.	8	304 40 33	311 15 13	2 30 25	3 0 19	5·8	5 25·9
Sat.	9	317 44 8	324 7 47	3 27 27	3 51 37	6·8	6 13·5
Sun.	10	330 26 41	336 41 20	4 12 37	4 30 22	7·8	6 57·8
Mon.	11	342 52 15	348 59 54	4 44 45	4 55 44	8·8	7 40·1
Tues.	12	355 4 47	1 7 18	5 3 16	5 7 23	9·8	8 21·5
Wed.	13	7 7 53	13 6 53	5 8 4	5 5 22	10·8	9 2·9
Thur.	14	19 4 39	25 1 28	4 59 20	4 50 5	11·8	9 45·3
Fri.	15	30 57 36	36 53 20	4 37 42	4 22 19	12·8	10 29·2
Sat.	16	42 48 50	48 44 22	4 4 6	3 43 13	13·8	11 15·2
Sun.	17	54 40 5	60 36 14	3 19 53	2 54 19	14·8	12 3·2
Mon.	18	66 33 0	72 30 36	2 26 46	1 57 31	15·8	12 52·8
Tues.	19	78 29 18	84 29 21	1 26 50	N. 0 55 2	16·8	13 43·4
Wed.	20	90 31 2	96 34 42	N. 0 22 25	S. 0 10 38	17·8	14 33·9
Thur.	21	102 40 42	108 49 24	S. 0 43 50	1 16 48	18·8	15 23·7
Fri.	22	115 1 14	121 16 39	1 49 10	2 20 33	19·8	16 12·3
Sat.	23	127 36 5	134 0 0	2 50 34	3 18 49	20·8	16 59·7
Sun.	24	140 28 51	147 3 4	3 44 54	4 8 24	21·8	17 46·6
Mon.	25	153 43 0	160 29 0	4 28 54	4 45 59	22·8	18 33·7
Tues.	26	167 21 16	174 19 56	4 59 16	5 8 21	23·8	19 22·1
Wed.	27	181 24 59	188 36 14	5 12 54	5 12 40	24·8	20 13·0
Thur.	28	195 53 19	203 15 44	5 7 24	4 57 2	25·8	21 7·6
Fri.	29	210 42 44	218 13 25	4 41 33	4 21 7	26·8	22 6·4
Sat.	30	225 46 45	233 21 33	3 56 0	3 26 39	27·8	23 9·1
Sun.	31	240 56 35	248 30 35	S. 2 53 36	S. 2 17 33	28·8	☌

1861. DECEMBER. 1861.

AT GREENWICH MEAN TIME.

THE MOON'S

Day of the Week.	Day of the Month.	Longitude. Noon.	Longitude. Midnight.	Latitude. Noon.	Latitude. Midnight.	Age. Noon.	Meridian Passage.
		° ′ ″	° ′ ″	° ′ ″	° ′ ″	d.	h. m.
Sun.	1	240 56 35	248 30 35	S. 2 53 36	S. 2 17 33	28·8	☌
Mon.	2	256 2 20	263 30 41	1 39 14	S. 0 59 27	0·4	0 14·0
Tues.	3	270 54 38	278 13 19	S. 0 19 2	N. 0 21 15	1·4	1 18·1
Wed.	4	285 26 3	292 32 22	N. 1 0 41	1 38 35	2·4	2 18·8
Thur.	5	299 31 57	306 24 41	2 14 26	2 47 44	3·4	3 14·8
Fri.	6	313 10 36	319 49 51	3 18 7	3 45 18	4·4	4 5·8
Sat.	7	326 22 44	332 49 38	4 9 6	4 29 20	5·4	4 52·8
Sun.	8	339 10 58	345 27 16	4 45 58	4 58 56	6·4	5 36·8
Mon.	9	351 39 2	357 46 49	5 8 15	5 13 55	7·4	6 19·1
Tues.	10	3 51 13	9 52 45	5 16 2	5 14 38	8·4	7 0·8
Wed.	11	15 51 59	21 49 25	5 9 48	5 1 39	9·4	7 42·9
Thur.	12	27 45 35	33 40 56	4 50 18	4 35 52	10·4	8 26·2
Fri.	13	39 35 54	45 30 54	4 18 30	3 58 21	11·4	9 11·4
Sat.	14	51 26 18	57 22 28	3 35 37	3 10 31	12·4	9 58·8
Sun.	15	63 19 40	69 18 12	2 43 14	2 14 4	13·4	10 48·1
Mon.	16	75 18 19	81 20 13	1 43 16	1 11 9	14·4	11 38·8
Tues.	17	87 24 8	93 30 15	N. 0 38 2	N. 0 4 16	15·4	12 30·0
Wed.	18	99 38 43	105 49 45	S. 0 29 46	S. 1 3 43	16·4	13 20·6
Thur.	19	112 3 29	118 20 6	1 37 9	2 9 40	17·4	14 10·0
Fri.	20	124 39 46	131 2 41	2 40 52	3 10 20	18·4	14 57·9
Sat.	21	137 29 1	143 58 57	3 37 39	4 2 26	19·4	15 44·7
Sun.	22	150 32 42	157 10 25	4 24 17	4 42 50	20·4	16 30·9
Mon.	23	163 52 16	170 38 22	4 57 44	5 8 41	21·4	17 17·6
Tues.	24	177 28 51	184 23 45	5 15 23	5 17 38	22·4	18 5·8
Wed.	25	191 23 2	198 26 38	5 15 14	5 8 4	23·4	18 56·7
Thur.	26	205 34 22	212 45 56	4 56 7	4 39 26	24·4	19 51·4
Fri.	27	220 0 59	227 19 1	4 18 9	3 52 34	25·4	20 50·2
Sat.	28	234 39 26	242 1 31	3 23 1	2 49 58	26·4	21 52·4
Sun.	29	249 24 30	256 47 32	2 14 2	1 35 50	27·4	22 56·0
Mon.	30	264 9 44	271 30 11	S. 0 56 6	S. 0 15 36	28·4	23 58·6
Tues.	31	278 48 1	286 2 24	N. 0 24 54	N. 1 4 41	29·4	☌
Wed.	32	293 12 35	300 17 56	N. 1 43 3	N. 2 19 22	0·9	0 57·7

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Aldebaran	W.	95 57 6	97 41 58	99 26 51	101 11 43
	Pollux	W.	53 56 30	55 41 44	57 27 1	59 12 21
	Spica	E.	37 39 18	35 53 31	34 7 45	32 22 3
	Antares	E.	83 16 46	81 30 31	79 44 15	77 57 59
	Venus	E.	85 59 17	84 22 39	82 46 0	81 9 21
	Sun	E.	117 19 9	115 40 32	114 1 54	112 23 16
2	Pollux	W.	67 59 22	69 44 48	71 30 14	73 15 39
	Jupiter	W.	32 38 1	34 23 57	36 9 55	37 55 55
	Antares	E.	69 6 45	67 20 32	65 34 21	63 48 12
	Venus	E.	73 6 8	71 29 32	69 52 58	68 16 25
	Sun	E.	104 10 8	102 31 32	100 52 58	99 14 25
3	Pollux	W.	82 2 26	83 47 43	85 32 56	87 18 8
	Jupiter	W.	46 46 11	48 32 14	50 18 16	52 4 16
	Regulus	W.	45 2 11	46 47 45	48 33 19	50 18 51
	Saturn	W.	34 0 8	35 44 45	37 29 27	39 14 13
	Antares	E.	54 57 53	53 11 56	51 26 2	49 40 11
	Venus	E.	60 14 14	58 37 56	57 1 41	55 25 30
	Sun	E.	91 2 10	89 23 50	87 45 32	86 7 17
4	Jupiter	W.	60 53 48	62 39 34	64 25 18	66 10 58
	Regulus	W.	59 5 56	60 51 13	62 36 26	64 21 36
	Saturn	W.	47 58 31	49 43 23	51 28 15	53 13 5
	Antares	E.	40 51 43	39 6 12	37 20 45	35 35 23
	Venus	E.	47 25 33	45 49 47	44 14 7	42 38 32
	Sun	E.	77 56 50	76 18 54	74 41 3	73 3 15
5	Jupiter	W.	74 58 24	76 43 41	78 28 53	80 13 59
	Regulus	W.	73 6 26	74 51 11	76 35 51	78 20 26
	Saturn	W.	61 56 39	63 41 13	65 25 43	67 10 8
	Venus	E.	34 42 15	33 7 23	31 32 40	29 58 8
	Sun	E.	64 55 23	63 18 2	61 40 47	60 3 37
6	Jupiter	W.	88 58 11	90 42 44	92 27 10	94 11 29
	Regulus	W.	87 1 56	88 45 55	90 29 48	92 13 34
	Saturn	W.	75 51 4	77 34 58	79 18 46	81 2 28
	Spica	W.	33 1 9	34 44 48	36 28 23	38 11 54
	Sun	E.	51 59 13	50 22 38	48 46 11	47 9 50
7	Jupiter	W.	102 51 13	104 34 45	106 18 9	108 1 23
	Saturn	W.	89 39 9	91 22 6	93 4 54	94 47 33
	Spica	W.	46 47 58	48 30 51	50 13 35	51 56 12
	Sun	E.	39 10 0	37 34 26	35 59 1	34 23 45
13	Sun	W.	33 26 25	34 51 20	36 16 1	37 40 29
	Mars	E.	39 10 50	37 44 23	36 18 13	34 52 21
	α Arietis	E.	68 20 22	66 48 14	65 16 19	63 44 39
	Aldebaran	E.	100 52 59	99 21 41	97 50 36	96 19 44
14	Sun	W.	44 39 41	46 2 56	47 25 59	48 48 52
	Mars	E.	27 47 29	26 23 29	24 59 50	23 36 33
	α Arietis	E.	56 9 34	54 39 12	53 9 1	51 39 2
	Aldebaran	E.	88 48 24	87 18 42	85 49 12	84 19 53

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
15	Sun	W.	55 40 53	57 2 51	58 24 42	59 46 25
	α Arietis	E.	44 11 54	42 43 0	41 14 15	39 45 40
	Aldebaran	E.	76 55 48	75 27 27	73 59 14	72 31 9
16	Sun	W.	66 33 34	67 54 46	69 15 54	70 37 0
	Fomalhaut	W.	40 26 24	41 35 24	42 45 21	43 56 12
	α Arietis	E.	32 25 4	30 57 25	29 29 54	28 2 34
	Aldebaran	E.	65 12 34	63 45 10	62 17 52	60 50 38
17	Sun	W.	77 22 6	78 43 7	80 4 9	81 25 13
	Fomalhaut	W.	50 1 27	51 16 22	52 31 49	53 47 46
	Aldebaran	E.	53 35 37	52 8 47	50 42 1	49 15 18
	Pollux	E.	95 21 55	93 53 53	92 25 49	90 57 43
18	Sun	W.	88 11 22	89 32 50	90 54 24	92 16 5
	Fomalhaut	W.	60 14 12	61 32 42	62 51 33	64 10 46
	α Pegasi	W.	37 25 29	38 46 29	40 8 4	41 30 11
	Aldebaran	E.	42 2 25	40 35 59	39 9 37	37 43 20
	Pollux	E.	83 36 25	82 7 56	80 39 21	79 10 39
19	Sun	W.	99 6 34	100 29 8	101 51 54	103 14 51
	Fomalhaut	W.	70 51 54	72 13 5	73 34 34	74 56 22
	α Pegasi	W.	48 27 55	49 52 45	51 17 59	52 43 36
	Mars	W.	29 8 29	30 32 6	31 56 1	33 20 14
	Pollux	E.	71 45 14	70 15 42	68 46 0	67 16 8
	Jupiter	E.	105 28 12	103 57 24	102 26 26	100 55 15
20	Sun	W.	110 12 51	111 37 10	113 1 45	114 26 35
	Fomalhaut	W.	81 49 50	83 13 24	84 37 16	86 1 24
	α Pegasi	W.	59 57 21	61 25 12	62 53 25	64 22 0
	Mars	W.	40 25 35	41 51 32	43 17 47	44 44 21
	Pollux	E.	59 43 46	58 12 39	56 41 19	55 9 44
	Jupiter	E.	93 16 4	91 43 30	90 10 41	88 37 36
21	Sun	W.	121 35 4	123 1 41	124 28 37	125 55 52
	α Pegasi	W.	71 50 18	73 21 3	74 52 10	76 23 39
	Mars	W.	52 1 53	53 30 23	54 59 13	56 28 24
	Pollux	E.	47 28 9	45 55 5	44 21 45	42 48 10
	Jupiter	E.	80 47 51	79 12 59	77 37 48	76 2 18
	Regulus	E.	84 11 54	82 37 51	81 3 29	79 28 48
	Saturn	E.	94 43 56	93 9 45	91 35 14	90 0 24
22	Sun	W.	133 17 14	134 46 34	136 16 15	137 46 18
	α Pegasi	W.	84 6 33	85 40 14	87 14 17	88 48 41
	Mars	W.	63 59 39	65 31 0	67 2 43	68 34 48
	Pollux	E.	34 56 39	33 21 41	31 46 33	30 11 16
	Jupiter	E.	67 59 40	66 22 6	64 44 10	63 5 53
	Regulus	E.	71 30 16	69 53 31	68 16 24	66 38 56
	Saturn	E.	82 1 6	80 24 11	78 46 55	77 9 17
23	Mars	W.	76 20 57	77 55 19	79 30 4	81 5 11
	α Arietis	W.	53 57 54	55 37 18	57 17 6	58 57 17
	Jupiter	E.	54 48 59	53 8 31	51 27 41	49 46 29
	Regulus	E.	58 26 5	56 46 25	55 6 23	53 25 59

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
23	Saturn	E.	68° 55′ 42″	67° 15′ 53″	65° 35′ 43″	63° 55′ 11″
24	Mars	W.	89 6 26	90 43 47	92 21 29	93 59 32
	α Arietis	W.	67 24 1	69 6 29	70 49 19	72 32 31
	Aldebaran	W.	35 36 15	37 15 21	38 55 5	40 35 24
	Jupiter	E.	41 15 16	39 32 1	37 48 28	36 4 36
	Regulus	E.	44 58 40	43 16 10	41 33 20	39 50 11
	Saturn	E.	55 27 15	53 44 39	52 1 44	50 18 30
25	Mars	W.	102 14 48	103 54 49	105 35 6	107 15 41
	α Arietis	W.	81 13 38	82 58 50	84 44 20	86 30 7
	Aldebaran	W.	49 4 47	50 48 2	52 31 42	54 15 45
	Jupiter	E.	27 21 15	25 35 57	23 50 30	22 4 58
	Regulus	E.	31 10 2	29 25 13	27 40 12	25 55 0
	Saturn	E.	41 38 3	39 53 12	38 8 9	36 22 55
26	Mars	W.	115 42 28	117 24 31	119 6 46	120 49 12
	α Arietis	W.	95 23 7	97 10 26	98 57 57	100 45 41
	Aldebaran	W.	63 1 9	64 47 9	66 33 24	68 19 54
	Saturn	E.	27 35 4	25 49 28	24 4 1	22 18 50
	Spica	E.	70 57 47	69 10 16	67 22 32	65 34 37
27	Aldebaran	W.	77 15 30	79 3 8	80 50 53	82 38 45
	Pollux	W.	35 15 21	37 2 23	38 49 43	40 37 16
	Spica	E.	56 32 30	54 43 40	52 54 44	51 5 43
	Antares	E.	102 13 20	100 24 15	98 35 4	96 45 47
28	Aldebaran	W.	91 39 13	93 27 26	95 15 39	97 3 51
	Pollux	W.	49 37 39	51 26 5	53 14 34	55 3 7
	Spica	E.	41 59 52	40 10 39	38 21 27	36 32 18
	Antares	E.	87 38 21	85 48 45	83 59 8	82 9 32
29	Pollux	W.	64 5 55	65 54 24	67 42 49	69 31 10
	Jupiter	W.	31 26 7	33 15 34	35 5 0	36 54 25
	Spica	E.	27 27 50	25 39 21	23 51 5	22 3 3
	Antares	E.	73 2 0	71 12 40	69 23 26	67 34 17
	Venus	E.	110 17 19	108 37 15	106 57 16	105 17 23
30	Pollux	W.	78 31 25	80 19 6	82 6 39	83 54 2
	Jupiter	W.	46 0 30	47 49 25	49 38 12	51 26 51
	Regulus	W.	41 30 31	43 18 29	45 6 20	46 54 2
	Antares	E.	58 30 17	56 41 54	54 53 40	53 5 35
	Venus	E.	96 59 39	95 20 31	93 41 32	92 2 42
	Sun	E.	121 55 33	120 14 46	118 34 9	116 53 41
31	Pollux	W.	92 48 25	94 34 44	96 20 52	98 6 47
	Jupiter	W.	60 27 48	62 15 28	64 2 58	65 50 16
	Regulus	W.	55 50 16	57 37 0	59 23 33	61 9 55
	Saturn	W.	46 5 13	47 51 47	49 38 13	51 24 30
	Antares	E.	44 7 49	42 20 49	40 34 1	38 47 26
	Venus	E.	83 51 8	82 13 22	80 35 48	78 58 26
	Sun	E.	108 33 57	106 54 33	105 15 21	103 36 21

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
1	Pollux	W.	106° 53′ 14″	108° 37′ 52″	110° 22′ 16″	112° 6′ 26″
	Jupiter	W.	74 43 50	76 29 57	78 15 50	80 1 31
	Regulus	W.	69 58 47	71 43 57	73 28 54	75 13 38
	Saturn	W.	60 13 24	61 58 38	63 43 41	65 28 32
	Antares	E.	29 57 33	28 12 14	26 27 7	24 42 13
	Venus	E.	70 54 40	69 18 33	67 42 38	66 6 57
	Sun	E.	95 24 27	93 46 42	92 9 10	90 31 50
2	Jupiter	W.	88 46 45	90 31 10	92 15 21	93 59 19
	Regulus	W.	83 54 9	85 37 36	87 20 51	89 3 53
	Saturn	W.	74 9 49	75 53 28	77 36 54	79 20 8
	Spica	W.	29 53 57	31 36 58	33 19 51	35 2 33
	Venus	E.	58 11 43	56 37 19	55 3 8	53 29 10
	α Aquilæ	E.	73 24 23	71 54 37	70 25 19	68 56 28
	Sun	E.	82 28 30	80 52 29	79 16 42	77 41 7
3	Jupiter	W.	102 35 58	104 18 40	106 1 8	107 43 25
	Regulus	W.	97 35 49	99 17 34	100 59 6	102 40 26
	Saturn	W.	87 53 12	89 35 11	91 16 58	92 58 32
	Spica	W.	43 33 25	45 15 2	46 56 27	48 37 41
	Venus	E.	45 42 34	44 9 53	42 37 25	41 5 9
	α Aquilæ	E.	61 40 19	60 14 55	58 50 13	57 26 16
	Sun	E.	69 46 28	68 12 11	66 38 6	65 4 14
4	Jupiter	W.	116 11 36	117 52 37	119 33 25	121 14 1
	Regulus	W.	111 3 57	112 44 2	114 23 54	116 3 35
	Saturn	W.	101 23 18	103 3 39	104 43 47	106 23 43
	Spica	W.	57 0 58	58 41 3	60 20 56	62 0 38
	Venus	E.	33 26 55	31 55 53	30 25 3	28 54 25
	α Aquilæ	E.	50 39 17	49 20 51	48 3 35	46 47 32
	Sun	E.	57 18 3	55 45 26	54 13 2	52 40 49
5	Saturn	W.	114 40 16	116 18 58	117 57 27	119 35 44
	Spica	W.	70 16 15	71 54 48	73 33 10	75 11 20
	Antares	W.	24 30 41	26 9 21	27 47 49	29 26 7
	Venus	E.	21 24 13	19 54 47	18 25 32	16 56 28
	Sun	E.	45 2 50	43 31 51	42 1 4	40 30 29
6	Spica	W.	83 19 25	84 56 28	86 33 20	88 10 1
	Antares	W.	37 34 48	39 11 59	40 48 59	42 25 47
	Sun	E.	33 0 37	31 31 16	30 2 8	28 33 13
11	Sun	W.	24 35 17	25 57 31	27 19 39	28 41 42
	Mars	E.	38 43 42	37 19 22	35 55 13	34 31 15
	α Arietis	E.	48 5 31	46 35 54	45 6 26	43 37 18
	Aldebaran	E.	80 46 57	79 17 53	77 48 58	76 20 12
12	Sun	W.	35 30 30	36 51 59	38 13 24	39 34 43
	Mars	E.	27 34 24	26 11 40	24 49 10	23 26 56
	α Arietis	E.	36 13 7	34 44 49	33 16 41	31 48 43
	Aldebaran	E.	68 58 21	67 30 23	66 2 31	64 34 47
	Pollux	E.	110 55 28	109 26 51	107 58 19	106 29 51
13	Sun	W.	46 20 20	47 41 18	49 2 13	50 23 6

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
13	Aldebaran	E.	57 17 48	55 50 43	54 23 45	52 56 52
	Pollux	E.	99 8 35	97 40 30	96 12 27	94 44 26
14	Sun	W.	57 7 18	58 28 9	59 49 0	61 9 54
	Aldebaran	E.	45 43 56	44 17 39	42 51 27	41 25 22
	Pollux	E.	87 24 40	85 56 43	84 28 45	83 0 46
15	Sun	W.	67 55 3	69 16 17	70 37 37	71 59 3
	Aldebaran	E.	34 16 53	32 51 41	31 26 42	30 1 57
	Pollux	E.	75 40 15	74 11 58	72 43 36	71 15 9
	Jupiter	E.	106 0 2	104 30 20	103 0 32	101 30 39
	Regulus	E.	112 35 16	111 6 33	109 37 44	108 8 50
16	Sun	W.	78 48 0	80 10 13	81 32 36	82 55 10
	Aldebaran	E.	23 4 2	21 42 14	20 21 22	19 1 40
	Pollux	E.	63 51 18	62 22 9	60 52 52	59 23 25
	Jupiter	E.	93 59 23	92 28 42	90 57 50	89 26 49
	Regulus	E.	100 42 25	99 12 42	97 42 48	96 12 44
	Saturn	E.	109 23 2	107 53 1	106 22 49	104 52 27
17	Sun	W.	89 50 59	91 14 48	92 38 53	94 3 13
	Mars	W.	29 12 29	30 37 41	32 3 14	33 29 7
	a Arietis	W.	24 1 30	25 31 4	27 1 5	28 31 32
	Pollux	E.	51 53 39	50 23 8	48 52 25	47 21 30
	Jupiter	E.	81 48 40	80 16 23	78 43 51	77 11 3
	Regulus	E.	88 39 24	87 8 4	85 36 29	84 4 39
	Saturn	E.	97 17 31	95 45 51	94 13 56	92 41 46
18	Sun	W.	101 9 1	102 35 5	104 1 28	105 28 10
	Mars	W.	40 43 40	42 11 37	43 39 56	45 8 37
	a Arietis	W.	36 9 42	37 42 30	39 15 41	40 49 15
	Pollux	E.	39 43 45	38 11 34	36 39 10	35 6 35
	Jupiter	E.	69 22 58	67 48 28	66 13 38	64 38 29
	Regulus	E.	76 21 17	74 47 43	73 13 50	71 39 37
	Saturn	E.	84 56 43	83 22 48	81 48 35	80 14 2
19	Sun	W.	112 46 54	114 15 45	115 44 58	117 14 34
	Mars	W.	52 37 41	54 8 40	55 40 4	57 11 52
	a Arietis	W.	48 42 59	50 18 57	51 55 19	53 32 6
	Pollux	E.	27 21 14	25 47 52	24 14 32	22 41 17
	Jupiter	E.	56 37 36	55 0 21	53 22 43	51 44 43
	Regulus	E.	63 43 20	62 6 59	60 30 16	58 53 9
	Saturn	E.	72 16 5	70 39 25	69 2 22	67 24 57
20	Sun	W.	124 48 35	126 20 37	127 53 3	129 25 55
	Mars	W.	64 57 9	66 31 30	68 6 17	69 41 30
	a Arietis	W.	61 42 24	63 21 46	65 1 34	66 41 48
	Aldebaran	W.	30 6 23	31 41 23	33 17 13	34 53 50
	Jupiter	E.	43 28 50	41 48 29	40 7 44	38 26 35
	Regulus	E.	50 41 40	49 2 9	47 22 13	45 41 53
	Saturn	E.	59 11 58	57 32 11	55 52 0	54 11 24
	Spica	E.	104 43 56	103 4 16	101 24 10	99 43 38
21	Mars	W.	77 44 14	79 22 6	81 0 24	82 39 9

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
21	*a* Arietis	W.	75 9 40	76 52 34	78 35 54	80 19 40
	Aldebaran	W.	43 7 21	44 47 57	46 29 8	48 10 53
	Jupiter	E.	29 55 3	28 11 39	26 27 56	24 43 54
	Regulus	E.	37 14 5	35 31 19	33 48 11	32 4 39
	Saturn	E.	45 42 30	43 59 34	42 16 15	40 32 35
	Spica	E.	91 14 27	89 31 17	87 47 42	86 3 41
22	Mars	W.	90 59 18	92 40 34	94 22 14	96 4 18
	a Arietis	W.	89 4 57	90 51 15	92 37 57	94 25 2
	Aldebaran	W.	56 47 35	58 32 24	60 17 41	62 3 25
	Regulus	E.	23 21 59	21 36 39	19 51 8	18 5 32
	Saturn	E.	31 49 27	30 4 2	28 18 26	26 32 43
	Spica	E.	77 17 14	75 30 43	73 43 47	71 56 28
23	Mars	W.	104 40 8	106 24 20	108 8 50	109 53 38
	a Arietis	W.	103 25 57	105 15 9	107 4 39	108 54 27
	Aldebaran	W.	70 58 19	72 46 27	74 34 55	76 23 42
	Pollux	W.	29 1 47	30 48 30	32 35 48	34 23 39
	Spica	E.	62 54 26	61 5 0	59 15 15	57 25 14
	Antares	E.	108 36 1	106 46 24	104 56 28	103 6 14
24	Mars	W.	118 41 33	120 27 48	122 14 14	124 0 49
	Aldebaran	W.	85 31 55	87 22 18	89 12 52	91 3 36
	Pollux	W.	43 29 33	45 19 48	47 10 21	49 1 9
	Spica	E.	48 11 12	46 19 44	44 28 6	42 36 18
	Antares	E.	93 51 0	91 59 15	90 7 18	88 15 11
25	Aldebaran	W.	100 19 14	102 10 36	104 1 59	105 53 23
	Pollux	W.	58 18 4	60 9 53	62 1 46	63 53 43
	Jupiter	W.	29 4 21	30 57 12	32 50 11	34 43 17
	Regulus	W.	21 16 54	23 8 15	24 59 52	26 51 40
	Spica	E.	33 15 48	31 23 34	29 31 20	27 39 9
	Antares	E.	78 52 34	76 59 46	75 6 55	73 14 3
26	Pollux	W.	73 13 39	75 5 32	76 57 20	78 49 2
	Jupiter	W.	44 9 19	46 2 28	47 55 33	49 48 33
	Regulus	W.	36 12 3	38 4 11	39 56 15	41 48 15
	Saturn	W.	28 35 33	30 26 41	32 17 57	34 9 18
	Antares	E.	63 49 53	61 57 13	60 4 38	58 12 11
27	Pollux	W.	88 5 25	89 56 9	91 46 40	93 36 58
	Jupiter	W.	59 11 31	61 3 36	62 55 28	64 47 7
	Regulus	W.	51 6 25	52 57 34	54 48 31	56 39 15
	Saturn	W.	43 25 45	45 16 47	47 7 39	48 58 21
	Antares	E.	48 52 9	47 0 42	45 9 29	43 18 29
	a Aquilæ	E.	102 7 14	100 29 48	98 52 24	97 15 4
28	Pollux	W.	102 44 34	104 33 14	106 21 35	108 9 38
	Jupiter	W.	74 1 39	75 51 44	77 41 32	79 31 1
	Regulus	W.	65 49 16	67 38 28	69 27 22	71 15 59
	Saturn	W.	58 8 45	59 58 6	61 47 11	63 35 59
	Antares	E.	34 7 21	32 17 58	30 28 53	28 40 7
	a Aquilæ	E.	89 10 39	87 34 26	85 58 31	84 22 55
	SUN	E.	126 40 45	124 59 10	123 17 52	121 36 51

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Jupiter	W.	88 33 41	90 21 14	92 8 26	93 55 18
	Regulus	W.	80 14 18	82 0 59	83 47 20	85 33 20
	Saturn	W.	72 35 27	74 22 24	76 9 1	77 55 19
	α Aquilæ	E.	76 30 44	74 57 38	73 25 4	71 53 1
	Sun	E.	113 16 28	111 37 22	109 58 35	108 20 9
2	Jupiter	W.	102 44 25	104 29 12	106 13 38	107 57 43
	Regulus	W.	94 18 15	96 2 11	97 45 48	99 29 3
	Saturn	W.	86 41 42	88 25 58	90 9 53	91 53 27
	Spica	W.	40 15 48	41 59 36	43 43 4	45 26 13
	α Aquilæ	E.	64 21 51	62 53 38	61 26 10	59 59 29
	Sun	E.	100 13 4	98 36 40	97 0 38	95 24 55
3	Jupiter	W.	116 33 0	118 15 2	119 56 45	121 38 8
	Saturn	W.	100 26 15	102 7 49	103 49 3	105 29 57
	Spica	W.	53 57 9	55 38 23	57 19 18	58 59 54
	α Aquilæ	E.	52 59 23	51 38 22	50 18 28	48 59 45
	Sun	E.	87 31 27	85 57 45	84 24 23	82 51 20
4	Saturn	W.	113 49 41	115 28 42	117 7 25	118 45 50
	Spica	W.	67 18 21	68 57 10	70 35 41	72 13 56
	Antares	W.	21 33 28	23 12 20	24 50 56	26 29 15
	Sun	E.	75 10 46	73 39 34	72 8 40	70 38 3
5	Spica	W.	80 21 5	81 57 45	83 34 9	85 10 19
	Antares	W.	34 36 52	36 13 37	37 50 8	39 26 24
	Sun	E.	63 9 8	61 40 10	60 11 26	58 42 58
6	Spica	W.	93 7 41	94 42 30	96 17 7	97 51 31
	Antares	W.	47 24 17	48 59 13	50 33 56	52 8 27
	Sun	E.	51 24 18	49 57 17	48 30 29	47 3 54
7	Spica	W.	105 40 34	107 13 50	108 46 55	110 19 49
	Antares	W.	59 58 6	61 31 28	63 4 41	64 37 43
	Sun	E.	39 54 18	38 29 1	37 3 58	35 39 7
8	Antares	W.	72 20 28	73 52 34	75 24 31	76 56 19
	Sun	E.	28 38 13	27 14 44	25 51 30	24 28 33
13	Sun	W.	26 59 30	28 19 29	29 39 33	30 59 42
	Mars	E.	26 47 9	25 24 31	24 2 0	22 39 37
	Aldebaran	E.	48 57 12	47 30 31	46 3 57	44 37 29
	Pollux	E.	90 44 0	89 16 1	87 48 2	86 20 4
14	Sun	W.	37 41 20	39 1 50	40 22 25	41 43 3
	Aldebaran	E.	37 27 4	36 1 26	34 36 0	33 10 46
	Pollux	E.	79 0 17	77 32 17	76 4 17	74 36 15
	Jupiter	E.	106 17 38	104 48 33	103 19 25	101 50 16
15	Sun	W.	48 27 22	49 48 29	51 9 42	52 31 1
	Aldebaran	E.	26 8 59	24 45 53	23 23 22	22 1 34
	Pollux	E.	67 15 29	65 47 11	64 18 49	62 50 22
	Jupiter	E.	94 23 44	92 54 15	91 24 40	89 55 0
	Saturn	E.	110 41 24	109 12 17	107 43 5	106 13 46
16	Sun	W.	59 19 26	60 41 32	62 3 47	63 26 11

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
16	Pollux	E.	55 26 55	53 57 57	52 28 52	50 59 40
	Jupiter	E.	82 25 5	80 54 44	79 24 14	77 53 36
	Regulus	E.	92 13 32	90 43 48	89 13 55	87 43 52
	Saturn	E.	98 45 33	97 15 32	95 45 21	94 15 1
17	Sun	W.	70 20 55	71 44 28	73 8 14	74 32 14
	α Arietis	W.	32 25 15	33 55 22	35 25 47	36 56 30
	Pollux	E.	43 31 52	42 1 55	40 31 51	39 1 39
	Jupiter	E.	70 17 50	68 46 7	67 14 11	65 42 3
	Regulus	E.	80 11 4	78 39 55	77 8 34	75 36 59
	Saturn	E.	86 40 45	85 9 19	83 37 40	82 5 48
18	Sun	W.	81 35 56	83 1 29	84 27 19	85 53 27
	α Arietis	W.	44 34 43	46 7 18	47 40 12	49 13 27
	Mars	W.	30 13 10	31 40 45	33 8 40	34 36 57
	Pollux	E.	31 28 58	29 58 10	28 27 21	26 56 31
	Jupiter	E.	57 57 45	56 24 7	54 50 13	53 16 1
	Regulus	E.	67 55 28	66 22 22	64 48 59	63 15 19
	Saturn	E.	74 22 52	72 49 30	71 15 52	69 41 56
19	Sun	W.	93 8 55	94 37 1	96 5 29	97 34 19
	α Arietis	W.	57 4 48	58 40 9	60 15 53	61 51 59
	Mars	W.	42 3 39	43 34 6	45 4 56	46 36 9
	Aldebaran	W.	25 37 50	27 7 46	28 38 38	30 10 21
	Jupiter	E.	45 20 30	43 44 26	42 8 2	40 31 18
	Regulus	E.	55 22 17	53 46 41	52 10 44	50 34 26
	Saturn	E.	61 47 40	60 11 51	58 35 42	56 59 12
20	Sun	W.	105 4 10	106 35 20	108 6 54	109 38 53
	α Arietis	W.	69 58 28	71 37 0	73 15 57	74 55 20
	Mars	W.	54 18 15	55 51 55	57 26 1	59 0 32
	Aldebaran	W.	38 0 6	39 36 1	41 12 33	42 49 41
	Jupiter	E.	32 22 24	30 43 34	29 4 24	27 24 53
	Regulus	E.	42 27 27	40 48 55	39 10 0	37 30 42
	Saturn	E.	48 51 22	47 12 42	45 33 41	43 54 17
21	Sun	W.	117 25 10	118 59 44	120 34 43	122 10 9
	α Arietis	W.	83 18 50	85 0 52	86 43 22	88 26 18
	Mars	W.	66 59 49	68 37 2	70 14 42	71 52 49
	Aldebaran	W.	51 3 50	52 44 18	54 25 18	56 6 49
	Regulus	E.	29 8 26	27 26 52	25 44 58	24 2 45
	Saturn	E.	35 31 54	33 50 23	32 8 35	30 26 29
	Spica	E.	83 5 50	81 23 32	79 40 47	77 57 35
22	Sun	W.	130 13 44	131 51 44	133 30 9	135 8 57
	Mars	W.	80 10 20	81 51 12	83 32 31	85 14 17
	Aldebaran	W.	64 42 6	66 26 39	68 11 40	69 57 11
	Saturn	E.	21 53 5	20 10 18	18 27 47	16 45 45
	Spica	E.	69 14 48	67 28 54	65 42 33	63 55 46
23	Mars	W.	93 49 35	95 33 54	97 18 36	99 3 41
	Aldebaran	W.	78 51 31	80 39 40	82 28 14	84 17 12
	Pollux	W.	36 52 26	38 39 54	40 27 53	42 16 24

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
23	Spica	E.	54 55 29	53 6 13	51 16 34	49 26 32
	Antares	E.	100 35 48	98 46 19	96 56 27	95 6 11
24	Mars	W.	107 54 27	109 41 35	111 28 59	113 16 40
	Aldebaran	W.	93 27 20	95 18 20	97 9 36	99 1 8
	Pollux	W.	51 25 45	53 16 49	55 8 14	56 59 59
	Spica	E.	40 11 19	38 19 22	36 27 9	34 34 43
	Antares	E.	85 49 33	83 57 15	82 4 40	80 11 48
25	Pollux	W.	66 22 43	68 15 56	70 9 18	72 2 48
	Jupiter	W.	39 42 38	41 36 43	43 30 57	45 25 21
	Regulus	W.	29 20 34	31 13 50	33 7 21	35 1 3
	Spica	E.	25 9 58	23 16 44	21 23 31	19 30 22
	Antares	E.	70 44 1	68 49 54	66 55 39	65 1 16
26	Pollux	W.	81 31 39	83 25 31	85 19 21	87 13 9
	Jupiter	W.	54 58 41	56 53 27	58 48 13	60 42 55
	Regulus	W.	44 31 24	46 25 39	48 19 54	50 14 7
	Saturn	W.	38 49 29	40 43 21	42 37 17	44 31 15
	Antares	E.	55 28 19	53 33 41	51 39 4	49 44 30
	a Aquilæ	E.	107 49 23	106 9 46	104 29 54	102 49 50
27	Pollux	W.	96 40 39	98 33 42	100 26 33	102 19 12
	Jupiter	W.	70 15 6	72 9 7	74 2 57	75 56 34
	Regulus	W.	59 44 0	61 37 35	63 30 59	65 24 11
	Saturn	W.	54 0 30	55 54 3	57 47 27	59 40 40
	Antares	E.	40 13 12	38 19 24	36 25 47	34 32 23
	a Aquilæ	E.	94 28 19	92 48 5	91 7 58	89 28 1
28	Jupiter	W.	85 20 55	87 12 55	89 4 37	90 55 59
	Regulus	W.	74 46 34	76 38 12	78 29 31	80 20 31
	Saturn	W.	69 3 21	70 55 5	72 46 31	74 37 37
	Antares	E.	25 9 17	23 17 34	21 26 12	19 35 11
	a Aquilæ	E.	81 12 10	79 34 2	77 56 20	76 19 6
29	Jupiter	W.	100 7 22	101 56 30	103 45 14	105 33 33
	Regulus	W.	89 30 10	91 18 58	93 7 22	94 55 22
	Saturn	W.	83 47 56	85 36 53	87 25 26	89 13 34
	Spica	W.	35 27 47	37 16 23	39 4 37	40 52 29
	a Aquilæ	E.	68 21 16	66 47 37	65 14 42	63 42 33
	Sun	E.	131 46 52	130 5 57	128 25 23	126 45 11
30	Jupiter	W.	114 28 50	116 14 36	117 59 55	119 44 49
	Saturn	W.	98 8 4	99 53 42	101 38 54	103 23 39
	Spica	W.	49 45 53	51 31 20	53 16 23	55 1 1
	a Aquilæ	E.	56 14 57	54 48 23	53 22 56	51 58 39
	Fomalhaut	E.	79 44 56	78 9 8	76 33 51	74 59 5
	Sun	E.	118 30 4	116 52 16	115 14 52	113 37 53
31	Saturn	W.	112 0 58	113 43 8	115 24 52	117 6 11
	Spica	W.	63 37 55	65 20 3	67 1 46	68 43 5
	a Aquilæ	E.	45 17 21	44 1 41	42 47 46	41 35 43
	Fomalhaut	E.	67 13 47	65 42 32	64 11 58	62 42 3
	Sun	E.	105 39 10	104 4 40	102 30 34	100 56 53

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Spica	W.	77 3 43	78 42 42	80 21 17	81 59 31
	Antares	W.	31 20 34	32 59 36	34 38 16	36 16 34
	Fomalhaut	E.	55 23 28	53 58 7	52 33 39	51 10 4
	Sun	E.	93 14 22	91 43 2	90 12 3	88 41 27
2	Spica	W.	90 5 24	91 41 34	93 17 25	94 52 58
	Antares	W.	44 22 50	45 59 5	47 35 2	49 10 39
	Fomalhaut	E.	44 27 26	43 10 20	41 54 33	40 40 10
	Sun	E.	81 13 42	79 45 10	78 16 57	76 49 3
3	Spica	W.	102 46 15	104 20 5	105 53 39	107 26 58
	Antares	W.	57 4 26	58 38 22	60 12 2	61 45 28
	Sun	E.	69 33 59	68 7 49	66 41 54	65 16 15
4	Antares	W.	69 29 7	71 1 12	72 33 6	74 4 48
	Sun	E.	58 11 37	56 47 22	55 23 19	53 59 29
5	Antares	W.	81 40 42	83 11 24	84 41 58	86 12 24
	Sun	E.	47 3 11	45 40 28	44 17 55	42 55 32
6	Antares	W.	93 42 41	95 12 24	96 42 2	98 11 34
	a Aquilæ	W.	46 39 50	47 48 30	48 57 58	50 8 9
	Sun	E.	36 6 4	34 44 39	33 23 24	32 2 19
7	Antares	W.	105 38 4	107 7 9	108 36 11	110 5 10
	a Aquilæ	W.	56 8 11	57 21 42	58 35 39	59 49 59
	Sun	E.	25 19 35	23 59 39	22 39 59	21 20 36
12	Sun	W.	29 51 43	31 12 50	32 34 7	33 55 35
	Pollux	E.	58 25 27	56 56 41	55 27 52	53 59 0
	Jupiter	E.	84 17 23	82 47 52	81 18 16	79 48 34
	Regulus	E.	95 12 43	93 43 12	92 13 36	90 43 54
	Saturn	E.	100 14 54	98 45 21	97 15 43	95 45 59
13	Sun	W.	40 45 31	42 8 1	43 30 42	44 53 33
	Pollux	E.	46 33 38	45 4 21	43 35 1	42 5 38
	Jupiter	E.	72 18 28	70 48 6	69 17 36	67 46 58
	Regulus	E.	83 13 45	81 43 22	80 12 49	78 42 9
	Saturn	E.	88 15 38	86 45 11	85 14 37	83 43 54
14	Sun	W.	51 50 34	53 14 33	54 38 45	56 3 9
	Pollux	E.	34 37 55	33 8 18	31 38 41	30 9 6
	Jupiter	E.	60 11 33	58 39 59	57 8 14	55 36 18
	Regulus	E.	71 6 28	69 34 50	68 3 1	66 31 0
	Saturn	E.	76 8 6	74 36 26	73 4 36	71 32 35
15	Sun	W.	63 8 31	64 34 19	66 0 21	67 26 40
	Aldebaran	W.	22 21 55	23 48 20	25 15 46	26 44 7
	Mars	W.	20 42 27	22 10 33	23 38 58	25 7 41
	Jupiter	E.	47 53 44	46 20 36	44 47 14	43 13 38
	Regulus	E.	58 47 54	57 14 37	55 41 7	54 7 22
	Saturn	E.	63 49 32	62 16 17	60 42 48	59 9 6
	Spica	E.	112 50 32	111 17 7	109 43 28	108 9 33
16	Sun	W.	74 42 19	76 10 20	77 38 39	79 7 17
	Aldebaran	W.	34 16 49	35 49 11	37 22 6	38 55 32

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
16	Mars	W.	32 35 50	34 6 23	35 37 16	37 8 29
	Jupiter	E.	35 22 8	33 47 5	32 11 48	30 36 16
	Regulus	E.	46 14 49	44 39 30	43 3 55	41 28 3
	Saturn	E.	51 16 56	49 41 45	48 6 17	46 30 34
	Spica	E.	100 15 57	98 40 22	97 4 29	95 28 17
17	Sun	W.	86 35 23	88 6 2	89 37 3	91 8 26
	Aldebaran	W.	46 49 59	48 26 17	50 3 1	51 40 13
	Mars	W.	44 49 37	46 22 54	47 56 34	49 30 35
	Jupiter	E.	22 35 8	20 58 19	19 21 22	17 44 22
	Regulus	E.	33 24 21	31 46 45	30 8 51	28 30 40
	Saturn	E.	38 27 55	36 50 35	35 13 0	33 35 10
	Spica	E.	87 22 23	85 44 11	84 5 36	82 26 41
18	Sun	W.	98 51 0	100 24 41	101 58 45	103 33 14
	Aldebaran	W.	59 52 51	61 32 43	63 13 1	64 53 46
	Mars	W.	57 26 29	59 2 51	60 39 38	62 16 49
	Regulus	E.	20 16 12	18 36 50	16 57 27	15 18 8
	Saturn	E.	25 22 57	23 44 7	22 5 18	20 26 35
	Spica	E.	74 6 22	72 25 8	70 43 31	69 1 29
19	Sun	W.	111 31 42	113 8 37	114 45 57	116 23 41
	Aldebaran	W.	73 24 7	75 7 30	76 51 19	78 35 34
	Mars	W.	70 28 56	72 8 37	73 48 44	75 29 15
	Pollux	W.	31 33 26	33 15 20	34 57 53	36 41 3
	Spica	E.	60 25 15	58 40 46	56 55 53	55 10 35
	Antares	E.	106 5 7	104 20 29	102 35 26	100 49 57
20	Sun	W.	124 38 21	126 18 28	127 58 56	129 39 47
	Aldebaran	W.	87 23 11	89 9 56	90 57 5	92 44 37
	Mars	W.	83 58 8	85 41 8	87 24 33	89 8 21
	Pollux	W.	45 25 21	47 11 46	48 58 40	50 46 1
	Spica	E.	46 18 1	44 30 20	42 42 16	40 53 50
	Antares	E.	91 56 21	90 8 24	88 20 4	86 31 20
21	Aldebaran	W.	101 47 44	103 37 23	105 27 19	107 17 33
	Mars	W.	97 52 59	99 38 58	101 25 18	103 11 56
	Pollux	W.	59 49 18	61 39 9	63 29 22	65 19 56
	Jupiter	W.	33 29 12	35 19 15	37 9 42	39 0 31
	Regulus	W.	22 47 51	24 37 19	26 27 18	28 17 45
	Saturn	W.	18 30 3	20 16 24	22 3 50	23 52 9
	Spica	E.	31 46 30	29 56 7	28 5 28	26 14 35
	Antares	E.	77 22 2	75 31 7	73 39 52	71 48 18
22	Mars	W.	112 9 27	113 57 43	115 46 11	117 34 51
	Pollux	W.	74 37 25	76 29 44	78 22 15	80 14 59
	Jupiter	W.	48 19 21	50 11 57	52 4 47	53 57 49
	Regulus	W.	37 35 52	39 28 28	41 21 18	43 14 23
	Saturn	W.	33 3 23	34 55 4	36 47 6	38 39 28
	Spica	E.	16 58 5	15 6 52	13 15 59	11 25 44
	Antares	E.	62 26 11	60 33 0	58 39 37	56 46 2
23	Pollux	W.	89 41 3	91 34 35	93 28 10	95 21 48

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
23	Jupiter	W.	63 25 27	65 19 20	67 13 16	69 7 14
	Regulus	W.	52 42 34	54 36 35	56 30 41	58 24 50
	Saturn	W.	48 4 55	49 58 31	51 52 14	53 46 2
	Antares	E.	47 15 53	45 21 32	43 27 9	41 32 43
	a Aquilæ	E.	100 39 48	98 59 15	97 18 30	95 37 36
24	Pollux	W.	104 49 39	106 43 1	108 36 14	110 29 19
	Jupiter	W.	78 37 1	80 30 48	82 24 28	84 18 1
	Regulus	W.	67 55 38	69 49 38	71 43 32	73 37 20
	Saturn	W.	63 15 22	65 9 8	67 2 48	68 56 21
	Antares	E.	32 0 51	30 6 41	28 12 38	26 18 45
	a Aquilæ	E.	87 12 30	85 31 39	83 50 58	82 10 29
25	Jupiter	W.	93 43 4	95 35 25	97 27 30	99 19 18
	Regulus	W.	83 3 41	84 56 19	86 48 41	88 40 46
	Saturn	W.	78 21 43	80 14 10	82 6 20	83 58 15
	Spica	W.	29 1 56	30 54 12	32 46 16	34 38 7
	Antares	E.	16 52 26	15 0 1	13 8 0	11 16 27
	a Aquilæ	E.	73 52 39	72 14 18	70 36 28	68 59 12
	Fomalhaut	E.	98 42 28	97 0 6	95 17 54	93 35 54
26	Jupiter	W.	108 33 30	110 23 17	112 12 41	114 1 41
	Regulus	W.	97 56 30	99 46 36	101 36 20	103 25 41
	Saturn	W.	93 13 8	95 3 4	96 52 37	98 41 47
	Spica	W.	43 53 13	45 43 16	47 32 58	49 22 18
	a Aquilæ	E.	61 2 57	59 30 6	57 58 10	56 27 14
	Fomalhaut	E.	85 9 56	83 29 47	81 50 2	80 10 44
	a Pegasi	E.	105 54 4	104 7 39	102 21 32	100 35 43
27	Regulus	W.	112 26 13	114 13 2	115 59 25	117 45 19
	Saturn	W.	107 41 26	109 28 3	111 14 14	112 59 57
	Spica	W.	58 23 3	60 9 58	61 56 26	63 42 29
	a Aquilæ	E.	49 9 53	47 46 26	46 24 31	45 4 16
	Fomalhaut	E.	72 1 45	70 25 39	68 50 11	67 15 21
	a Pegasi	E.	91 52 4	90 8 31	88 25 23	86 42 41
28	Saturn	W.	121 41 34	123 34 29	125 6 54	126 48 51
	Spica	W.	72 26 2	74 9 24	75 52 19	77 34 47
	Antares	W.	26 44 12	28 27 34	30 10 31	31 53 1
	Fomalhaut	E.	59 32 2	58 1 44	56 32 18	55 3 45
	a Pegasi	E.	78 16 1	76 36 5	74 56 39	73 17 43
	Sun	E.	124 15 18	122 39 33	121 4 14	119 29 20
29	Spica	W.	86 0 30	87 40 21	89 19 46	90 58 46
	Antares	W.	40 18 59	41 58 54	43 38 23	45 17 27
	Fomalhaut	E.	47 56 6	46 33 55	45 13 0	43 53 25
	a Pegasi	E.	65 10 32	63 34 38	61 59 16	60 24 25
	Sun	E.	111 41 20	110 9 0	108 37 5	107 5 35
30	Spica	W.	99 7 41	100 44 17	102 20 32	103 56 24
	Antares	W.	53 26 47	55 3 30	56 39 50	58 15 48
	Fomalhaut	E.	37 38 29	36 28 50	35 21 16	34 15 56
	a Pegasi	E.	52 38 21	51 6 49	49 35 52	48 5 32
	Sun	E.	99 34 2	98 4 52	96 36 4	95 7 38

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Spica	W.	111 50 35	113 24 26	114 57 59	116 31 14
	Antares	W.	66 10 31	67 44 29	69 18 9	70 51 31
	a Pegasi	E.	40 43 29	39 17 11	37 51 41	36 27 1
	Sun	E.	87 50 35	86 24 8	84 58 0	83 32 9
2	Antares	W.	78 34 17	80 6 5	81 37 39	83 9 0
	a Pegasi	E.	29 38 29	28 20 24	27 3 50	25 48 57
	Sun	E.	76 27 1	75 2 45	73 38 43	72 14 54
3	Antares	W.	90 42 42	92 12 54	93 42 57	95 12 50
	a Aquilæ	W.	44 16 31	45 23 54	46 32 11	47 41 16
	Sun	E.	65 18 53	63 56 14	62 33 45	61 11 25
4	Antares	W.	102 40 19	104 9 29	105 38 33	107 7 31
	a Aquilæ	W.	53 36 51	54 49 38	56 2 53	57 16 34
	Sun	E.	54 21 50	53 0 17	51 38 50	50 17 28
5	Antares	W.	114 31 22	115 59 59	117 28 33	118 57 6
	a Aquilæ	W.	63 30 21	64 46 1	66 1 57	67 18 7
	Fomalhaut	W.	39 25 57	40 33 14	41 41 36	42 50 57
	Sun	E.	43 31 59	42 11 6	40 50 16	39 29 30
6	*a* Aquilæ	W.	73 42 8	74 59 28	76 16 58	77 34 37
	Fomalhaut	W.	48 50 3	50 3 56	51 18 24	52 33 24
	Sun	E.	32 46 25	31 25 57	30 5 32	28 45 9
12	Sun	W.	34 4 42	35 30 4	36 55 39	38 21 28
	Pollux	E.	25 30 45	24 1 46	22 33 11	21 5 5
	Jupiter	E.	52 7 6	50 34 48	49 2 20	47 29 42
	Regulus	E.	61 40 57	60 7 56	58 34 46	57 1 25
	Saturn	E.	66 28 28	64 55 49	63 23 1	61 50 3
13	Sun	W.	45 33 52	47 1 1	48 28 24	49 56 1
	Jupiter	E.	39 44 9	38 10 32	36 36 46	35 2 50
	Regulus	E.	49 12 2	47 37 37	46 3 1	44 28 13
	Saturn	E.	54 2 43	52 28 44	50 54 35	49 20 15
	Spica	E.	103 13 18	101 38 37	100 3 43	98 28 36
14	Sun	W.	57 17 40	58 46 44	60 16 4	61 45 39
	Mars	W.	24 6 33	25 38 18	27 10 18	28 42 33
	Jupiter	E.	27 10 50	25 36 2	24 1 8	22 26 9
	Regulus	E.	36 31 24	34 55 28	33 19 22	31 43 4
	Saturn	E.	41 26 0	39 50 38	38 15 7	36 39 26
	Spica	E.	90 29 43	88 53 14	87 16 30	85 39 32
15	Sun	W.	69 17 35	70 48 48	72 20 18	73 52 6
	Mars	W.	36 27 43	38 1 34	39 35 41	41 10 6
	Regulus	E.	23 39 15	22 2 9	20 25 1	18 47 55
	Saturn	E.	28 39 7	27 2 48	25 26 29	23 50 12
	Spica	E.	77 30 49	75 52 17	74 13 27	72 34 20
16	Sun	W.	81 35 33	83 9 10	84 43 6	86 17 21
	Mars	W.	49 6 37	50 42 50	52 19 22	53 56 13
	Pollux	W.	27 55 30	29 33 1	31 11 11	32 49 56
	Saturn	E.	15 52 51	14 19 31	12 47 46	11 18 23

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
16	Spica	E.	64 14 27	62 33 34	60 52 23	59 10 53
	Antares	E.	109 53 35	108 12 34	106 31 14	104 49 35
17	Sun	W.	94 13 26	95 49 39	97 26 11	99 3 3
	Mars	W.	62 5 17	63 44 5	65 23 12	67 2 40
	Pollux	W.	41 11 40	42 53 26	44 35 39	46 18 18
	Spica	E.	50 38 44	48 55 21	47 11 40	45 27 39
	Antares	E.	96 16 31	94 32 55	92 48 59	91 4 43
18	Sun	W.	107 12 21	108 51 11	110 30 22	112 9 51
	Mars	W.	75 24 57	77 6 24	78 48 11	80 30 17
	Pollux	W.	54 57 39	56 42 42	58 28 6	60 13 53
	Jupiter	W.	26 50 28	28 34 52	30 19 41	32 4 56
	Regulus	W.	17 59 14	19 43 2	21 27 32	23 12 39
	Spica	E.	36 42 57	34 57 7	33 10 59	31 24 35
	Antares	E.	82 18 27	80 32 12	78 45 38	76 58 44
19	Sun	W.	120 31 57	122 13 16	123 54 52	125 36 44
	Mars	W.	89 5 32	90 49 30	92 33 45	94 18 17
	Pollux	W.	69 7 58	70 55 47	72 43 53	74 32 18
	Jupiter	W.	40 56 54	42 44 21	44 32 7	46 20 12
	Regulus	W.	32 5 48	33 53 43	35 41 59	37 30 35
	Saturn	W.	27 31 38	29 17 51	31 4 36	32 51 50
	Spica	E.	22 29 2	20 41 23	18 53 40	17 5 58
	Antares	E.	67 59 32	66 10 47	64 21 45	62 32 26
20	Sun	W.	134 9 48	135 53 5	137 36 34	139 20 13
	Mars	W.	103 4 54	104 50 57	106 37 12	108 23 40
	Pollux	W.	83 38 27	85 28 26	87 18 37	89 9 1
	Jupiter	W.	55 24 50	57 14 32	59 4 28	60 54 36
	Regulus	W.	46 38 20	48 28 42	50 19 19	52 10 10
	Saturn	W.	41 54 5	43 43 34	45 33 19	47 23 21
	Antares	E.	53 21 57	51 31 8	49 40 7	47 48 54
	α Aquilæ	E.	106 4 16	104 27 14	102 49 48	101 12 1
21	Pollux	W.	98 23 29	100 14 46	102 6 8	103 57 35
	Jupiter	W.	70 7 58	71 59 4	73 50 16	75 41 34
	Regulus	W.	61 27 12	63 19 4	65 11 2	67 3 7
	Saturn	W.	56 36 46	58 27 59	60 19 19	62 10 46
	Antares	E.	38 30 19	36 38 12	34 46 0	32 53 43
	α Aquilæ	E.	92 58 49	91 19 36	89 40 15	88 0 51
23	Pollux	W.	113 15 14	115 6 42	116 58 6	118 49 25
	Jupiter	W.	84 58 46	86 50 13	88 41 39	90 33 1
	Regulus	W.	76 24 18	78 16 34	80 8 48	82 1 0
	Saturn	W.	71 29 1	73 20 43	75 12 25	77 4 3
	Spica	W.	22 24 30	24 16 2	26 7 41	27 59 23
	Antares	E.	23 31 53	21 39 35	19 47 22	17 55 15
	α Aquilæ	E.	79 44 4	78 5 2	76 26 12	74 47 38
	Fomalhaut	E.	104 44 27	103 3 1	101 21 27	99 39 47
23	Jupiter	W.	99 48 24	101 39 4	103 29 32	105 19 49
	Regulus	W.	91 20 35	93 12 6	95 3 26	96 54 34

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
23	Saturn	W.	86 20 56	88 11 55	90 2 43	91 53 20
	Spica	W.	37 17 33	39 8 55	41 0 9	42 51 12
	a Aquilæ	E.	66 40 7	65 4 2	63 28 32	61 53 42
	Fomalhaut	E.	91 11 30	89 30 6	87 48 52	86 7 49
	a Pegasi	E.	112 15 35	110 28 0	108 40 29	106 53 3
24	Jupiter	W.	114 27 40	116 16 24	118 4 51	119 52 58
	Regulus	W.	106 6 49	107 56 27	109 45 48	111 34 49
	Saturn	W.	101 2 55	102 52 1	104 40 49	106 29 18
	Spica	W.	52 3 24	53 53 6	55 42 30	57 31 37
	a Aquilæ	E.	54 11 31	52 42 0	51 13 38	49 46 30
	Fomalhaut	E.	77 46 47	76 7 38	74 28 56	72 50 41
	a Pegasi	E.	97 58 17	96 11 58	94 25 54	92 40 8
25	Saturn	W.	115 26 27	117 12 45	118 58 38	120 44 7
	Spica	W.	66 32 14	68 19 17	70 5 58	71 52 16
	Antares	W.	20 51 25	22 38 24	24 25 2	26 11 18
	a Aquilæ	E.	42 53 21	41 36 4	40 20 55	39 8 4
	Fomalhaut	E.	64 47 37	63 12 53	61 38 51	60 5 35
	a Pegasi	E.	83 56 7	82 12 24	80 29 5	78 46 11
26	Spica	W.	80 37 46	82 21 37	84 5 3	85 48 4
	Antares	W.	34 56 54	36 40 49	38 24 18	40 7 23
	Fomalhaut	E.	52 32 1	51 4 13	49 37 31	48 11 59
	a Pegasi	E.	70 18 16	68 38 6	66 58 26	65 19 17
27	Spica	W.	94 16 45	95 57 13	97 37 15	99 16 52
	Antares	W.	48 36 27	50 17 0	51 57 8	53 36 51
	Fomalhaut	E.	41 24 26	40 7 35	38 52 32	37 39 26
	a Pegasi	E.	57 11 27	55 35 33	54 0 16	52 25 34
	a Arietis	E.	99 13 33	97 33 21	95 53 34	94 14 12
	Sun	E.	130 25 41	128 52 31	127 19 45	125 47 24
28	Spica	W.	107 28 50	109 6 1	110 42 49	112 19 14
	Antares	W.	61 49 21	63 26 39	65 3 34	66 40 6
	Fomalhaut	E.	32 8 26	31 10 26	30 15 40	29 24 23
	a Pegasi	E.	44 41 42	43 11 0	41 41 4	40 11 55
	a Arietis	E.	86 3 28	84 26 31	82 49 57	81 13 46
	Sun	E.	118 11 36	116 41 37	115 12 0	113 42 46
29	Antares	W.	74 37 23	76 11 48	77 45 54	79 19 41
	a Pegasi	E.	32 59 42	31 36 25	30 14 23	28 53 44
	a Arietis	E.	73 18 19	71 44 17	70 10 35	68 37 12
	Sun	E.	106 21 57	104 54 49	103 28 0	102 1 29
30	Antares	W.	87 4 6	88 36 9	90 7 57	91 39 30
	a Aquilæ	W.	41 29 18	42 35 25	43 42 37	44 50 49
	a Arietis	E.	60 54 54	59 23 18	57 51 59	56 20 55
	Sun	E.	94 53 24	93 28 36	92 4 3	90 39 45
31	Antares	W.	99 13 56	100 44 14	102 14 20	103 44 17
	a Aquilæ	W.	50 43 37	51 56 5	53 9 3	54 22 29
	a Arietis	E.	48 49 14	47 19 34	45 50 7	44 20 51
	Sun	E.	83 41 33	82 18 30	80 55 38	79 32 56

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	α Aquilæ	W.	60 35 23	61 50 54	63 6 41	64 22 43
	Fomalhaut	W.	37 5 44	38 10 15	39 16 4	40 23 4
	α Arietis	E.	36 57 25	35 29 16	34 1 18	32 33 31
	Sun	E.	72 41 35	71 19 41	69 57 53	68 36 10
2	α Aquilæ	W.	70 45 57	72 3 8	73 20 28	74 37 56
	Fomalhaut	W.	46 12 37	47 24 56	48 37 55	49 51 31
	α Arietis	E.	25 17 24	23 50 51	22 24 34	20 58 37
	Sun	E.	61 48 38	60 27 17	59 5 57	57 44 38
3	α Aquilæ	W.	81 7 15	82 25 27	83 43 45	85 2 9
	Fomalhaut	W.	56 7 26	57 23 59	58 40 56	59 58 15
	α Pegasi	W.	33 21 7	34 40 14	36 0 3	37 20 29
	Sun	E.	50 58 9	49 36 48	48 15 25	46 54 0
4	α Aquilæ	W.	91 35 20	92 54 11	94 13 5	95 32 1
	Fomalhaut	W.	66 29 55	67 49 9	69 8 40	70 28 27
	α Pegasi	W.	44 10 16	45 33 31	46 57 7	48 21 4
	Sun	E.	40 6 6	38 44 20	37 22 28	36 0 31
5	α Aquilæ	W.	102 7 11	103 26 15	104 45 18	106 4 19
	Fomalhaut	W.	77 10 58	78 32 9	79 53 32	81 15 7
	α Pegasi	W.	55 25 31	56 51 16	58 17 17	59 43 33
	Sun	E.	29 9 24	27 46 52	26 24 14	25 1 30
10	Sun	W.	28 23 48	29 53 27	31 23 19	32 53 24
	Jupiter	E.	33 28 44	31 53 41	30 18 31	28 43 15
	Regulus	E.	39 31 36	37 55 10	36 18 35	34 41 51
	Saturn	E.	45 31 21	43 55 45	42 20 0	40 44 8
	Spica	E.	93 30 31	91 53 35	90 16 27	88 39 7
11	Sun	W.	40 27 5	41 58 28	43 30 3	45 1 51
	Jupiter	E.	20 46 19	19 11 6	17 36 6	16 1 26
	Regulus	E.	26 36 27	24 59 8	23 21 47	21 44 28
	Saturn	E.	32 43 16	31 6 54	29 30 30	27 54 8
	Spica	E.	80 29 29	78 50 58	77 12 14	75 33 19
12	Sun	W.	52 44 1	54 17 5	55 50 22	57 23 51
	Mars	W.	28 49 12	30 24 38	32 0 17	33 36 9
	Saturn	E.	19 54 22	18 19 28	16 45 18	15 12 9
	Spica	E.	67 15 43	65 35 35	63 55 15	62 14 44
	Antares	E.	112 54 31	111 14 15	109 33 47	107 53 6
13	Sun	W.	65 14 30	66 49 17	68 24 16	69 59 29
	Mars	W.	41 38 39	43 15 48	44 53 10	46 30 45
	Spica	E.	53 49 3	52 7 19	50 25 22	48 43 14
	Antares	E.	99 26 32	97 44 35	96 2 25	94 20 3
14	Sun	W.	77 58 45	79 35 16	81 11 59	82 48 56
	Mars	W.	54 41 53	56 20 45	57 59 51	59 39 9
	Spica	E.	40 9 35	38 26 17	36 42 48	34 59 8
	Antares	E.	85 44 58	84 1 18	82 17 26	80 33 20
15	Sun	W.	90 56 51	92 35 5	94 13 31	95 52 9
	Mars	W.	67 58 54	69 39 29	71 20 17	73 1 17

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
15	Jupiter	W.	33 36 33	35 19 52	37 3 28	38 47 19
	Regulus	W.	28 18 54	30 3 8	31 47 42	33 32 35
	Saturn	W.	22 33 13	24 14 36	25 56 38	27 39 13
	Spica	E.	26 18 25	24 33 53	22 49 17	21 4 38
	Antares	E.	71 49 41	70 4 20	68 18 46	66 33 0
	α Aquilæ	E.	121 59 32	120 31 7	119 1 57	117 32 7
16	Sun	W.	104 8 22	105 48 12	107 28 13	109 8 24
	Mars	W.	81 29 17	83 11 28	84 53 50	86 36 23
	Jupiter	W.	47 30 19	49 15 36	51 1 5	52 46 46
	Regulus	W.	42 20 58	44 7 22	45 54 0	47 40 50
	Saturn	W.	36 18 41	38 3 38	39 48 53	41 34 25
	Antares	E.	57 41 8	55 54 11	54 7 3	52 19 45
	α Aquilæ	E.	109 54 2	108 20 54	106 47 21	105 13 24
17	Sun	W.	117 31 56	119 13 7	120 54 26	122 35 54
	Mars	W.	95 11 40	96 55 11	98 38 51	100 22 39
	Jupiter	W.	61 38 0	63 24 46	65 11 40	66 58 43
	Regulus	W.	56 37 57	58 25 54	60 14 1	62 2 16
	Saturn	W.	50 25 42	52 12 35	53 59 39	55 46 54
	Antares	E.	43 20 42	41 32 26	39 44 2	37 55 30
	α Aquilæ	E.	97 18 41	95 42 56	94 7 0	92 30 53
18	Sun	W.	131 4 53	132 46 58	134 29 7	136 11 20
	Mars	W.	109 3 21	110 47 46	112 32 16	114 16 49
	Jupiter	W.	75 55 47	77 43 29	79 31 17	81 19 8
	Regulus	W.	71 5 25	72 54 21	74 43 23	76 32 28
	Saturn	W.	64 45 16	66 33 17	68 21 24	70 9 36
	Antares	E.	28 51 16	27 2 11	25 13 3	23 23 52
	α Aquilæ	E.	84 28 43	82 52 10	81 15 39	79 39 11
	Fomalhaut	E.	109 30 4	107 52 18	106 14 14	104 35 55
19	Mars	W.	123 0 5	124 44 46	126 29 25	128 14 2
	Jupiter	W.	90 18 56	92 6 56	93 54 54	95 42 50
	Regulus	W.	85 38 30	87 27 45	89 16 59	91 6 10
	Saturn	W.	79 11 16	80 59 39	82 48 1	84 36 22
	Spica	W.	31 36 13	33 25 11	35 14 10	37 3 11
	α Aquilæ	E.	71 39 3	70 3 42	68 28 41	66 54 3
	Fomalhaut	E.	96 21 41	94 42 31	93 3 19	91 24 7
	α Pegasi	E.	117 46 11	116 1 4	114 15 50	112 30 31
20	Jupiter	W.	104 41 34	106 29 1	108 16 22	110 3 34
	Regulus	W.	100 11 16	102 0 1	103 48 39	105 37 8
	Saturn	W.	93 37 15	95 25 9	97 12 56	99 0 35
	Spica	W.	46 7 48	47 56 32	49 45 11	51 33 42
	α Aquilæ	E.	59 8 6	57 36 45	56 6 10	54 36 25
	Fomalhaut	E.	83 9 1	81 30 23	79 51 58	78 13 46
	α Pegasi	E.	103 43 24	101 58 1	100 12 43	98 27 29
21	Jupiter	W.	118 57 0	120 43 5	122 28 55	124 14 32
	Regulus	W.	114 37 6	116 24 30	118 11 40	119 58 36
	Saturn	W.	107 56 18	109 42 50	111 29 9	113 15 13
	Spica	W.	60 34 3	62 21 35	64 8 55	65 56 1

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
21	α Aquilæ	E.	47 23 8	46 0 15	44 38 54	43 19 12
	Fomalhaut	E.	70 7 25	68 31 18	66 55 39	65 20 30
	α Pegasi	E.	89 43 20	87 59 2	86 14 57	84 31 6
22	Saturn	W.	122 1 28	123 45 49	125 29 50	127 13 30
	Spica	W.	74 47 49	76 33 22	78 18 37	80 3 34
	Antares	W.	29 7 0	30 52 35	32 37 52	34 22 52
	Fomalhaut	E.	57 33 47	56 2 33	54 32 9	53 2 37
	α Pegasi	E.	75 55 55	74 13 49	72 32 4	70 50 41
	α Arietis	E.	118 38 45	116 53 34	115 8 39	113 24 2
23	Spica	W.	88 43 31	90 26 30	92 9 9	93 51 26
	Antares	W.	43 3 11	44 46 15	46 28 59	48 11 22
	Fomalhaut	E.	45 50 30	44 27 44	43 6 22	41 46 32
	α Pegasi	E.	62 29 45	60 50 52	59 12 28	57 34 34
	α Arietis	E.	104 45 35	103 2 52	101 20 30	99 38 29
24	Spica	W.	102 17 26	103 57 32	105 37 16	107 16 38
	Antares	W.	56 37 53	58 18 6	59 57 57	61 37 26
	Fomalhaut	E.	35 34 53	34 27 8	33 22 0	32 19 41
	α Pegasi	E.	49 33 5	47 58 33	46 24 40	44 51 26
	α Arietis	E.	91 13 42	89 33 50	87 54 20	86 15 11
25	Spica	W.	115 27 56	117 5 5	118 41 54	120 18 21
	Antares	W.	69 49 25	71 26 44	73 3 42	74 40 19
	α Pegasi	E.	37 16 46	35 48 27	34 21 9	32 54 57
	α Arietis	E.	78 4 59	76 28 2	74 51 27	73 15 13
26	Antares	W.	82 38 16	84 12 53	85 47 11	87 21 10
	α Pegasi	E.	26 4 30	24 47 38	23 33 2	22 20 59
	α Arietis	E.	65 19 14	63 45 3	62 11 11	60 37 39
	Sun	E.	125 2 32	123 35 2	122 7 50	120 40 57
27	Antares	W.	95 6 44	96 39 2	98 11 4	99 42 52
	α Aquilæ	W.	47 25 15	48 37 17	49 49 57	51 3 12
	α Arietis	E.	52 54 32	51 22 48	49 51 20	48 20 8
	Sun	E.	113 30 53	112 5 41	110 40 45	109 16 3
28	Antares	W.	107 18 26	108 48 56	110 19 15	111 49 23
	α Aquilæ	W.	57 16 14	58 31 54	59 47 52	61 4 4
	Fomalhaut	W.	34 28 8	35 29 15	36 32 0	37 36 15
	α Arietis	E.	40 48 4	39 18 23	37 48 57	36 19 45
	Sun	E.	102 15 58	100 52 33	99 29 20	98 6 17
29	Antares	W.	119 17 49	120 47 7	122 16 19	123 45 25
	α Aquilæ	W.	67 28 11	68 45 30	70 2 57	71 20 31
	Fomalhaut	W.	43 15 32	44 26 18	45 37 50	46 50 5
	α Arietis	E.	28 57 16	27 29 30	26 2 0	24 34 47
	Sun	E.	91 13 17	89 51 4	88 28 57	87 6 56
30	α Aquilæ	W.	77 49 56	79 8 5	80 26 18	81 44 36
	Fomalhaut	W.	53 0 19	54 15 52	55 31 50	56 48 13
	α Pegasi	E.	30 4 19	31 21 41	32 39 55	33 58 53
	Sun	E.	80 17 55	78 56 16	77 34 38	76 13 1

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
1	α Aquilæ	W.	88° 17′ 2″	89° 35′ 40″	90° 54′ 22″	92° 13′ 7″
	Fomalhaut	W.	63 15 23	64 33 45	65 52 25	67 11 21
	α Pegasi	W.	40 42 44	42 4 57	43 27 35	44 50 35
	Aldebaran	E.	38 34 3	37 7 52	35 41 48	34 15 53
	Sun	E.	69 24 50	68 3 7	66 41 21	65 19 31
2	α Aquilæ	W.	98 47 21	100 6 16	101 25 12	102 44 8
	Fomalhaut	W.	73 49 49	75 10 13	76 30 51	77 51 42
	α Pegasi	W.	51 50 36	53 15 30	54 40 42	56 6 10
	Aldebaran	E.	27 9 28	25 45 6	24 21 12	22 57 51
	Sun	E.	58 29 11	57 6 49	55 44 20	54 21 44
3	α Aquilæ	W.	109 18 35	110 37 21	111 56 3	113 14 40
	Fomalhaut	W.	84 39 4	86 1 9	87 23 24	88 45 51
	α Pegasi	W.	63 17 31	64 44 34	66 11 52	67 39 25
	Sun	E.	47 26 33	46 3 2	44 39 21	43 15 28
4	Fomalhaut	W.	95 40 39	97 4 5	98 27 39	99 51 22
	α Pegasi	W.	75 0 59	76 30 3	77 59 22	79 28 56
	α Arietis	W.	31 34 13	33 5 9	34 36 23	36 7 57
	Sun	E.	36 13 12	34 48 7	33 22 49	31 57 18
10	Sun	W.	36 18 25	37 54 20	39 30 25	41 6 39
	Spica	E.	57 5 12	55 22 23	53 39 25	51 56 18
	Antares	E.	102 43 0	101 0 0	99 16 49	97 33 30
11	Sun	W.	49 10 0	50 47 5	52 24 17	54 1 37
	Spica	E.	43 18 47	41 34 56	39 50 58	38 6 55
	Antares	E.	88 54 40	87 10 30	85 26 12	83 41 47
12	Sun	W.	62 9 59	63 47 58	65 26 3	67 4 14
	Jupiter	W.	25 49 41	27 31 43	29 14 0	30 56 33
	Regulus	W.	25 13 13	26 56 55	28 40 51	30 25 2
	Spica	E.	29 25 34	27 41 9	25 56 43	24 12 19
	Antares	E.	74 57 57	73 12 52	71 27 41	69 42 25
13	Sun	W.	75 16 28	76 55 9	78 33 54	80 12 44
	Jupiter	W.	39 32 5	41 15 39	42 59 20	44 43 8
	Regulus	W.	39 8 36	40 53 44	42 39 1	44 24 23
	Saturn	W.	30 51 12	32 34 12	34 17 28	36 0 56
	Antares	E.	60 54 45	59 8 59	57 23 8	55 37 13
	α Aquilæ	E.	112 42 38	111 11 5	109 39 8	108 6 51
14	Sun	W.	88 27 49	90 6 59	91 46 13	93 25 30
	Jupiter	W.	53 23 36	55 7 57	56 52 21	58 36 50
	Regulus	W.	53 12 39	54 58 33	56 44 30	58 30 32
	Saturn	W.	44 41 1	46 25 27	48 10 0	49 54 38
	Antares	E.	46 46 45	45 0 30	43 14 13	41 27 53
	α Aquilæ	E.	100 21 16	98 47 30	97 13 35	95 39 32
15	Sun	W.	101 42 25	103 21 53	105 1 22	106 40 53
	Jupiter	W.	67 19 57	69 4 42	70 49 28	72 34 16
	Regulus	W.	67 21 23	69 7 40	70 53 59	72 40 19
	Saturn	W.	58 39 3	60 24 7	62 9 14	63 54 23

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
15	Antares	E.	32 35 45	30 49 16	29 2 47	27 16 17
	a Aquilæ	E.	87 48 8	86 13 47	84 39 27	83 5 11
	Fomalhaut	E.	112 50 14	111 15 22	109 40 13	108 4 49
16	Sun	W.	114 58 28	116 37 58	118 17 27	119 56 54
	Regulus	W.	81 32 10	83 18 32	85 4 53	86 51 13
	Jupiter	W.	81 18 23	83 3 12	84 48 1	86 32 48
	Saturn	W.	72 40 29	74 25 44	76 10 59	77 56 13
	Spica	W.	27 30 52	29 16 48	31 2 47	32 48 49
	Antares	E.	18 24 10	16 37 54	14 51 45	13 5 44
	a Aquilæ	E.	75 15 30	73 42 5	72 8 55	70 36 1
	Fomalhaut	E.	100 4 58	98 28 37	96 52 10	95 15 41
17	Sun	W.	128 13 39	129 52 51	131 31 59	133 11 3
	Regulus	W.	95 42 22	97 28 28	99 14 29	101 0 26
	Jupiter	W.	95 16 12	97 0 44	98 45 11	100 29 35
	Saturn	W.	86 41 55	88 26 56	90 11 52	91 56 45
	Spica	W.	41 39 6	43 25 7	45 11 5	46 57 0
	a Aquilæ	E.	62 56 51	61 26 22	59 56 26	58 27 6
	Fomalhaut	E.	87 13 12	85 36 52	84 0 37	82 24 30
	a Pegasi	E.	108 4 4	106 21 26	104 38 47	102 56 8
18	Regulus	W.	109 48 50	111 34 12	113 19 27	115 4 33
	Jupiter	W.	109 10 10	110 53 58	112 37 38	114 21 10
	Saturn	W.	100 39 48	102 24 6	104 8 16	105 52 18
	Spica	W.	55 45 34	57 31 1	59 16 22	61 1 35
	a Aquilæ	E.	51 11 44	49 47 24	48 24 11	47 2 10
	Fomalhaut	E.	74 26 36	72 51 44	71 17 10	69 42 56
	a Pegasi	E.	94 23 34	92 41 16	90 59 5	89 17 0
19	Saturn	W.	114 30 11	116 13 14	117 56 5	119 38 45
	Spica	W.	69 45 42	71 30 4	73 14 16	74 58 17
	Antares	W.	24 4 47	25 49 8	27 33 20	29 17 23
	a Aquilæ	E.	40 34 23	39 22 15	38 12 20	37 4 48
	Fomalhaut	E.	61 57 48	60 26 14	58 55 14	57 24 52
	a Pegasi	E.	80 48 50	79 7 44	77 26 50	75 46 10
20	Spica	W.	83 35 28	85 18 16	87 0 51	88 43 12
	Antares	W.	37 54 49	39 37 41	41 20 21	43 2 46
	Fomalhaut	E.	50 4 7	48 38 37	47 14 10	45 50 51
	a Pegasi	E.	67 26 37	65 47 34	64 8 50	62 30 27
	a Arietis	E.	109 53 7	108 10 36	106 28 19	104 46 15
21	Spica	W.	97 11 15	98 52 6	100 32 40	102 12 57
	Antares	W.	51 31 17	53 12 14	54 52 54	56 33 19
	Fomalhaut	E.	39 14 40	38 0 21	36 48 2	35 37 51
	a Pegasi	E.	54 24 14	52 48 16	51 12 46	49 37 47
	a Arietis	E.	96 19 30	94 38 55	92 58 35	91 18 32
22	Spica	W.	110 30 13	112 8 49	113 47 6	115 25 7
	Antares	W.	64 51 11	66 29 54	68 8 20	69 46 29
	Fomalhaut	E.	30 26 24	29 33 40	28 44 45	27 59 56
	a Pegasi	E.	41 51 27	40 20 10	38 49 39	37 19 57

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
22	α Arietis	E.	83 2 25	81 24 3	79 45 59	78 8 13
23	Antares	W.	77 52 48	79 29 11	81 5 17	82 41 6
	α Pegasi	E.	30 6 40	28 43 47	27 22 29	26 2 58
	α Arietis	E.	70 3 48	68 27 49	66 52 8	65 16 45
	Aldebaran	E.	102 44 53	101 9 34	99 34 32	97 59 47
24	Antares	W.	90 35 52	92 9 59	93 43 51	95 17 26
	α Aquilæ	W.	44 0 10	45 10 42	46 22 8	47 34 23
	α Arietis	E.	57 24 16	55 50 39	54 17 20	52 44 17
	Aldebaran	E.	90 10 7	88 37 0	87 4 9	85 31 34
25	Antares	W.	103 1 33	104 33 38	106 5 31	107 37 9
	α Aquilæ	W.	53 44 59	55 0 33	56 16 30	57 32 46
	α Arietis	E.	45 3 16	43 31 54	42 0 47	40 29 57
	Aldebaran	E.	77 52 31	76 21 28	74 50 38	73 20 3
	Sun	E.	132 10 55	130 45 59	129 21 17	127 56 47
26	Antares	W.	115 12 18	116 42 46	118 13 3	119 43 11
	α Aquilæ	W.	63 57 54	65 15 30	66 33 14	67 51 6
	Fomalhaut	W.	40 4 43	41 13 34	42 23 25	43 34 10
	α Arietis	E.	32 59 45	31 30 31	30 1 34	28 32 55
	Aldebaran	E.	65 50 26	64 21 9	62 52 4	61 23 10
	Sun	E.	120 57 26	119 34 7	118 10 59	116 48 1
27	α Aquilæ	W.	74 21 49	75 40 10	76 58 34	78 17 0
	Fomalhaut	W.	49 38 42	50 53 21	52 8 30	53 24 4
	α Pegasi	W.	26 43 5	27 57 56	29 13 57	30 31 0
	Aldebaran	E.	54 1 24	52 33 34	51 5 53	49 38 21
	Sun	E.	109 55 16	108 33 5	107 11 1	105 49 1
28	α Aquilæ	W.	84 49 37	86 8 13	87 26 48	88 45 25
	Fomalhaut	W.	59 47 29	61 5 7	62 23 2	63 41 12
	α Pegasi	W.	37 7 34	38 28 37	39 50 6	41 12 0
	Aldebaran	E.	42 23 2	40 56 26	39 29 59	38 3 42
	Sun	E.	99 0 9	97 38 31	96 16 55	94 55 19
29	α Aquilæ	W.	95 18 29	96 37 5	97 55 41	99 14 15
	Fomalhaut	W.	70 15 34	71 35 5	72 54 48	74 14 43
	α Pegasi	W.	48 6 40	49 30 29	50 54 35	52 18 55
	Aldebaran	E.	30 55 10	29 30 11	28 5 30	26 41 12
	Sun	E.	88 7 16	86 45 34	85 23 49	84 2 0
30	α Aquilæ	W.	105 46 48	107 5 12	108 23 32	109 41 49
	Fomalhaut	W.	80 57 8	82 18 10	83 39 22	85 0 45
	α Pegasi	W.	59 24 19	60 50 6	62 16 7	63 42 23
	Aldebaran	E.	19 48 3	18 28 4	17 9 30	15 52 43
	Sun	E.	77 11 38	75 49 14	74 26 42	73 4 2
31	α Aquilæ	W.	116 11 49	117 29 26	118 46 53	120 4 8
	Fomalhaut	W.	91 50 14	93 12 38	94 35 12	95 57 55
	α Pegasi	W.	70 57 14	72 24 57	73 52 54	75 21 6
	α Arietis	W.	27 25 33	28 54 51	30 24 31	31 54 30
	Sun	E.	66 8 18	64 44 37	63 20 44	61 56 38

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Fomalhaut	W.	102 53 43	104 17 16	105 40 57	107 4 44
	a Pegasi	W.	82 46 1	84 15 48	85 45 51	87 16 10
	a Arietis	W.	39 29 16	41 1 10	42 33 23	44 5 55
	Sun	E.	54 52 45	53 27 15	52 1 29	50 35 28
2	Fomalhaut	W.	114 4 50	115 28 59	116 53 8	118 17 15
	a Pegasi	W.	94 51 57	96 23 57	97 56 13	99 28 46
	a Arietis	W.	51 53 24	53 27 52	55 2 39	56 37 47
	Sun	E.	43 21 13	41 53 30	40 25 30	38 57 12
3	*a* Pegasi	W.	107 15 33	108 49 42	110 24 6	111 58 44
	a Arietis	W.	64 38 26	66 15 35	67 53 3	69 30 52
	Aldebaran	W.	32 37 44	34 11 46	35 46 24	37 21 36
	Sun	E.	31 31 15	30 1 10	28 30 48	27 0 8
8	Sun	W.	32 42 39	34 22 29	36 2 25	37 42 27
	Spica	E.	33 13 18	31 26 28	29 39 37	27 52 46
	Antares	E.	78 47 27	77 0 7	75 12 42	73 25 13
9	Sun	W.	46 3 34	47 43 55	49 24 16	51 4 38
	Saturn	W.	24 28 38	26 12 13	27 56 11	29 40 27
	Venus	W.	22 25 2	24 0 22	25 36 5	27 12 7
	Spica	E.	18 59 31	17 13 24	15 27 38	13 42 21
	Antares	E.	64 27 5	62 39 23	60 51 41	59 3 58
	a Aquilæ	E.	115 42 50	114 10 19	112 37 24	111 4 8
10	Sun	W.	59 26 17	61 6 32	62 46 43	64 26 51
	Saturn	W.	38 24 48	40 10 0	41 55 16	43 40 34
	Venus	W.	35 15 14	36 52 12	38 29 13	40 6 16
	Antares	E.	50 5 45	48 18 14	46 30 45	44 43 21
	a Aquilæ	E.	103 13 45	101 39 8	100 4 23	98 29 33
11	Sun	W.	72 46 30	74 26 12	76 5 47	77 45 17
	Saturn	W.	52 27 1	54 12 14	55 57 23	57 42 28
	Venus	W.	48 11 30	49 48 27	51 25 22	53 2 12
	Antares	E.	35 47 26	34 0 32	32 13 44	30 27 2
	a Aquilæ	E.	90 35 7	89 0 21	87 25 40	85 51 6
	Fomalhaut	E.	115 42 57	114 8 14	112 33 18	110 58 9
12	Sun	W.	86 1 11	87 40 1	89 18 44	90 57 19
	Saturn	W.	66 26 44	68 11 19	69 55 48	71 40 9
	Venus	W.	61 5 17	62 41 38	64 17 52	65 54 0
	Spica	W.	24 20 13	26 5 33	27 50 52	29 36 8
	Antares	E.	21 35 28	19 49 36	18 3 55	16 18 26
	a Aquilæ	E.	78 0 53	76 27 32	74 54 28	73 21 42
	Fomalhaut	E.	103 0 26	101 24 41	99 48 55	98 13 10
13	Sun	W.	99 8 16	100 46 3	102 23 41	104 1 10
	Venus	W.	73 52 55	75 28 19	77 3 36	78 38 45
	Spica	W.	38 21 23	40 6 9	41 50 48	43 35 20
	a Aquilæ	E.	65 43 36	64 13 20	62 43 36	61 14 26
	Fomalhaut	E.	90 15 12	88 39 54	87 4 45	85 29 45
	a Pegasi	E.	111 13 33	109 32 16	107 51 2	106 9 52

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
14	Sun	W.	112° 6′ 22″	113° 42′ 57″	115° 19′ 22″	116° 55′ 37″
	Venus	W.	86 32 21	88 6 38	89 40 46	91 14 45
	Spica	W.	52 16 5	53 59 50	55 43 26	57 26 54
	α Aquilæ	E.	53 58 49	52 34 5	51 10 19	49 47 34
	Fomalhaut	E.	77 37 42	76 4 1	74 30 37	72 57 31
	α Pegasi	E.	97 45 21	96 4 46	94 24 18	92 43 59
15	Sun	W.	124 54 23	126 29 37	128 4 41	129 39 33
	Venus	W.	99 2 14	100 35 14	102 8 4	103 40 43
	Spica	W.	66 1 55	67 44 27	69 26 49	71 9 2
	Antares	W.	20 21 42	22 4 7	23 46 24	25 28 34
	α Aquilæ	E.	43 12 14	41 57 36	40 44 43	39 33 46
	Fomalhaut	E.	65 17 23	63 46 37	62 16 19	60 46 32
	α Pegasi	E.	84 24 39	82 45 17	81 6 7	79 27 8
16	Venus	W.	111 21 19	112 52 52	114 24 14	115 55 25
	Spica	W.	79 37 33	81 18 44	82 59 44	84 40 33
	Antares	W.	33 57 4	35 38 17	37 19 19	39 0 12
	Fomalhaut	E.	53 26 35	52 0 41	50 35 37	49 11 26
	α Pegasi	E.	71 15 26	69 37 47	68 0 24	66 23 16
	α Arietis	E.	113 50 8	112 9 17	110 28 37	108 48 8
17	Spica	W.	93 1 52	94 41 33	96 21 3	98 0 20
	Antares	W.	47 21 49	49 1 35	50 41 9	52 20 32
	Fomalhaut	E.	42 26 17	41 9 2	39 53 18	38 39 12
	α Pegasi	E.	58 22 2	56 46 45	55 11 50	53 37 18
	α Arietis	E.	100 28 18	98 48 54	97 9 41	95 30 40
18	Spica	W.	106 13 45	107 51 48	109 29 39	111 7 17
	Antares	W.	60 34 24	62 12 33	63 50 30	65 28 15
	Fomalhaut	E.	32 58 54	31 58 12	31 0 28	30 5 59
	α Pegasi	E.	45 51 3	44 19 17	42 48 5	41 17 30
	α Arietis	E.	87 18 34	85 40 46	84 3 11	82 25 48
	Aldebaran	E.	119 50 38	118 13 49	116 37 9	115 0 40
19	Spica	W.	119 12 9	120 48 27	122 24 32	124 0 23
	Antares	W.	73 33 44	75 10 11	76 46 24	78 22 25
	α Pegasi	E.	33 55 41	32 30 3	31 5 33	29 42 18
	α Arietis	E.	74 22 13	72 46 10	71 10 20	69 34 45
	Aldebaran	E.	107 1 0	105 25 38	103 50 28	102 15 31
20	Antares	W.	86 19 8	87 53 49	89 28 17	91 2 32
	α Aquilæ	W.	40 56 24	42 3 55	43 12 40	44 22 32
	α Arietis	E.	61 40 14	60 6 2	58 32 4	56 58 21
	Aldebaran	E.	94 23 50	92 50 8	91 16 39	89 43 23
21	Antares	W.	98 50 30	100 23 27	101 56 12	103 28 45
	α Aquilæ	W.	50 25 4	51 39 38	52 54 45	54 10 20
	α Arietis	E.	49 13 16	47 40 58	46 8 55	44 37 6
	Aldebaran	E.	82 0 15	80 28 17	78 56 31	77 24 58
22	Antares	W.	111 8 30	112 39 52	114 11 4	115 42 5
	α Aquilæ	W.	60 33 46	61 51 17	63 9 1	64 26 56

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
22	Fomalhaut	W.	37 1 15	38 7 13	39 14 30	40 22 58
	α Arietis	E.	37 1 43	35 31 24	34 1 21	32 31 35
	Aldebaran	E.	69 50 21	68 20 3	66 49 58	65 20 3
23	α Aquilæ	W.	70 58 32	72 17 7	73 35 46	74 54 27
	Fomalhaut	W.	46 19 26	47 32 59	48 47 6	50 1 46
	α Pegasi	W.	23 36 47	24 47 46	26 0 30	27 14 44
	α Arietis	E.	25 7 9	23 39 18	22 11 52	20 44 54
	Aldebaran	E.	57 53 28	56 24 44	54 56 10	53 27 47
24	α Aquilæ	W.	81 28 17	82 47 4	84 5 51	85 24 36
	Fomalhaut	W.	56 21 38	57 38 41	58 56 1	60 13 37
	α Pegasi	W.	33 41 57	35 1 43	36 22 2	37 42 52
	Aldebaran	E.	46 8 35	44 41 17	43 14 11	41 47 15
	Sun	E.	128 41 5	127 19 25	125 57 52	124 36 22
25	α Aquilæ	W.	91 57 58	93 16 32	94 35 3	95 53 31
	Fomalhaut	W.	66 45 4	68 3 57	69 23 0	70 42 13
	α Pegasi	W.	44 32 49	45 55 44	47 18 55	48 42 20
	Aldebaran	E.	34 35 36	33 9 57	31 44 34	30 19 28
	Sun	E.	117 49 40	116 28 27	115 7 14	113 46 1
26	α Aquilæ	W.	102 24 59	103 43 4	105 1 5	106 19 0
	Fomalhaut	W.	77 20 34	78 40 40	80 0 53	81 21 14
	α Pegasi	W.	55 42 36	57 7 14	58 32 4	59 57 4
	Aldebaran	E.	23 19 53	21 57 38	20 36 11	19 15 43
	Sun	E.	106 59 48	105 38 28	104 17 5	102 55 37
27	α Aquilæ	W.	112 47 2	114 4 16	115 21 20	116 38 13
	Fomalhaut	W.	88 4 55	89 26 2	90 47 16	92 8 37
	α Pegasi	W.	67 4 50	68 30 57	69 57 16	71 23 46
	Sun	E.	96 7 4	94 45 2	93 22 52	92 0 34
28	Fomalhaut	W.	98 57 12	100 19 15	101 41 25	103 3 42
	α Pegasi	W.	78 39 26	80 7 13	81 35 14	83 3 29
	α Arietis	W.	35 15 59	36 45 42	38 15 41	39 45 58
	Sun	E.	85 6 37	83 43 17	82 19 44	80 55 58
29	Fomalhaut	W.	109 56 27	111 19 14	112 42 4	114 4 56
	α Pegasi	W.	90 28 28	91 58 15	93 28 17	94 58 35
	α Arietis	W.	47 21 45	48 53 48	50 26 11	51 58 53
	Sun	E.	73 53 36	72 28 21	71 2 50	69 37 1
30	Fomalhaut	W.	120 59 14	122 21 56	123 44 31	125 6 57
	α Pegasi	W.	102 34 22	104 6 23	105 38 40	107 11 16
	α Arietis	W.	59 47 21	61 22 5	62 57 11	64 32 39
	Aldebaran	W.	27 54 45	29 25 34	30 57 7	32 29 22
	Sun	E.	62 23 26	60 55 46	59 27 45	57 59 25
31	α Pegasi	W.	114 58 27	116 32 43	118 7 14	119 42 1
	α Arietis	W.	72 35 35	74 13 20	75 51 28	77 30 0
	Aldebaran	W.	40 19 51	41 55 38	43 31 56	45 8 46
	Sun	E.	50 32 27	49 1 59	47 31 9	45 59 57

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	*a* Arietis	W.	85 48 38	87 29 33	89 10 53	90 52 36
	Aldebaran	W.	53 20 17	55 0 1	56 40 13	58 20 51
	Sun	E.	38 18 36	36 45 16	35 11 36	33 37 36
2	*a* Arietis	W.	99 27 2	101 11 4	102 55 27	104 40 12
	Aldebaran	W.	66 50 36	68 33 48	70 17 24	72 1 24
	Pollux	W.	25 19 39	26 59 29	28 40 11	30 21 41
	Sun	E.	25 43 16	24 7 42	22 31 59	20 56 11
6	Sun	W.	29 2 40	30 45 6	32 27 37	34 10 11
	Antares	E.	54 40 19	52 49 24	50 58 32	49 7 42
	a Aquilæ	E.	107 10 31	105 33 19	103 55 56	102 18 22
7	Sun	W.	42 43 0	44 25 24	46 7 42	47 49 53
	Antares	E.	39 54 47	38 4 33	36 14 27	34 24 31
	a Aquilæ	E.	94 9 25	92 31 39	90 53 57	89 16 23
8	Sun	W.	56 18 41	57 59 56	59 40 59	61 21 50
	Venus	W.	24 47 40	26 25 8	28 2 39	29 40 11
	Spica	W.	20 38 46	22 26 43	24 14 37	26 2 24
	Antares	E.	25 17 40	23 28 57	21 40 30	19 52 20
	a Aquilæ	E.	81 11 20	79 35 5	77 59 10	76 23 37
	Fomalhaut	E.	106 25 9	104 47 12	103 9 15	101 31 22
9	Sun	W.	69 42 46	71 22 14	73 1 28	74 40 27
	Venus	W.	37 46 46	39 23 42	41 0 27	42 37 1
	Spica	W.	34 59 2	36 45 47	38 32 19	40 18 37
	a Aquilæ	E.	68 32 10	66 59 23	65 27 10	63 55 34
	Fomalhaut	E.	93 23 30	91 46 25	90 9 32	88 32 54
	a Pegasi	E.	114 24 47	112 41 46	110 58 54	109 16 11
10	Sun	W.	82 51 26	84 28 50	86 5 58	87 42 50
	Venus	W.	50 36 43	52 11 59	53 47 1	55 21 49
	Spica	W.	49 6 28	50 51 17	52 35 51	54 20 9
	a Aquilæ	E.	56 28 10	55 1 8	53 35 3	52 9 57
	Fomalhaut	E.	80 33 49	78 58 57	77 24 27	75 50 20
	a Pegasi	E.	100 45 21	99 3 49	97 22 29	95 41 24
11	Sun	W.	95 43 6	97 18 20	98 53 18	100 28 0
	Venus	W.	63 12 6	64 45 25	66 18 29	67 51 18
	Spica	W.	62 57 43	64 40 26	66 22 54	68 5 7
	a Aquilæ	E.	45 21 59	44 4 30	42 48 36	41 34 26
	Fomalhaut	E.	68 6 2	66 34 34	65 3 38	63 33 14
	a Pegasi	E.	87 19 45	85 40 12	84 0 55	82 21 55
12	Sun	W.	108 17 33	109 50 41	111 23 33	112 56 10
	Spica	W.	76 32 19	78 13 0	79 53 26	81 33 37
	Venus	W.	75 31 41	77 3 2	78 34 8	80 5 0
	Antares	W.	30 53 0	32 33 39	34 14 4	35 54 15
	Fomalhaut	E.	56 10 21	54 43 50	53 18 5	51 53 9
	a Pegasi	E.	74 11 12	72 33 56	70 56 59	69 20 21
13	Sun	W.	120 35 29	122 6 37	123 37 29	125 8 7
	Spica	W.	89 50 59	91 29 46	93 8 18	94 46 37

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
13	Venus	W.	87 35 50	89 5 19	90 34 35	92 3 37
	Antares	W.	44 11 42	45 50 30	47 29 5	49 7 27
	Fomalhaut	E.	45 2 39	43 43 51	42 26 21	41 10 14
	a Pegasi	E.	61 22 0	59 47 21	58 13 4	56 39 9
	a Arietis	E.	103 37 33	101 59 6	100 20 53	98 42 53
14	Sun	W.	132 37 43	134 6 55	135 35 53	137 4 36
	Spica	W.	102 54 55	104 31 56	106 8 44	107 45 20
	Venus	W.	99 25 34	100 53 19	102 20 52	103 48 13
	Antares	W.	57 16 1	58 53 7	60 29 59	62 6 40
	Fomalhaut	E.	35 14 39	34 9 34	33 6 55	32 6 53
	a Pegasi	E.	48 55 36	47 24 12	45 53 19	44 22 57
	a Arietis	E.	90 36 6	88 59 23	87 22 52	85 46 33
15	Venus	W.	111 1 56	112 28 6	113 54 3	115 19 50
	Antares	W.	70 7 4	71 42 34	73 17 53	74 53 1
	a Pegasi	E.	37 0 13	35 33 50	34 8 20	32 43 47
	a Arietis	E.	77 48 2	76 12 56	74 38 1	73 3 18
	Aldebaran	E.	110 26 26	108 51 59	107 17 42	105 43 35
16	Antares	W.	82 45 55	84 19 58	85 53 50	87 27 32
	a Arietis	E.	65 12 34	63 38 59	62 5 35	60 32 23
	Aldebaran	E.	97 55 30	96 22 23	94 49 26	93 16 39
17	Antares	W.	95 13 29	96 46 11	98 18 43	99 51 6
	a Aquilæ	W.	47 34 25	48 47 7	50 0 32	51 14 35
	a Arietis	E.	52 49 11	51 17 7	49 45 13	48 13 32
	Aldebaran	E.	85 35 13	84 3 25	82 31 48	81 0 20
18	Antares	W.	107 30 39	109 2 6	110 33 25	112 4 35
	a Aquilæ	W.	57 32 26	58 49 12	60 6 17	61 23 39
	Fomalhaut	W.	34 28 14	35 30 4	36 33 36	37 38 40
	a Arietis	E.	40 37 58	39 7 28	37 37 10	36 7 5
	Aldebaran	E.	73 25 27	71 54 57	70 24 37	68 54 27
	Pollux	E.	115 20 3	113 49 31	112 19 6	110 48 48
19	Antares	W.	119 38 19	121 8 41	122 38 54	124 9 0
	a Aquilæ	W.	67 53 39	69 12 8	70 30 43	71 49 25
	Fomalhaut	W.	43 22 34	44 34 17	45 46 46	46 59 57
	a Arietis	E.	28 40 18	27 11 45	25 43 32	24 15 40
	Aldebaran	E.	61 25 59	59 56 46	58 27 43	56 58 49
	Pollux	E.	103 19 9	101 49 34	100 20 6	98 50 45
20	*a* Aquilæ	W.	78 23 50	79 42 49	81 1 49	82 20 49
	Fomalhaut	W.	53 14 24	54 30 40	55 47 17	57 4 14
	a Pegasi	W.	30 37 59	31 56 9	33 15 5	34 34 42
	Aldebaran	E.	49 36 45	48 8 50	46 41 4	45 13 29
	Pollux	E.	91 25 38	89 56 55	88 28 17	86 59 46
21	*a* Aquilæ	W.	88 55 33	90 14 23	91 33 10	92 51 54
	Fomalhaut	W.	63 33 6	64 51 32	66 10 10	67 28 57
	a Pegasi	W.	41 20 23	42 42 41	44 5 16	45 28 7
	Aldebaran	E.	37 58 20	36 31 55	35 5 43	33 39 46
	Pollux	E.	79 38 22	78 10 19	76 42 20	75 14 24

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
22	α Aquilæ	W.	99 24 28	100 42 43	102 0 53	103 18 55
	Fomalhaut	W.	74 5 5	75 24 40	76 44 22	78 4 10
	α Pegasi	W.	52 25 37	53 49 40	55 13 52	56 38 13
	Aldebaran	E.	26 34 37	25 10 47	23 47 29	22 24 50
	Pollux	E.	67 55 34	66 27 55	65 0 18	63 32 42
23	α Aquilæ	W.	109 47 16	111 4 30	112 21 34	113 38 26
	Fomalhaut	W.	84 44 28	86 4 46	87 25 9	88 45 36
	α Pegasi	W.	63 42 4	65 7 14	66 32 32	67 57 58
	Pollux	E.	56 14 57	54 47 25	53 19 52	51 52 18
	Regulus	E.	92 58 30	91 30 2	90 1 31	88 32 56
	Sun	E.	125 55 47	124 34 54	123 13 58	121 52 57
24	α Aquilæ	W.	119 59 35	121 15 2	122 30 11	123 44 59
	Fomalhaut	W.	95 28 49	96 49 39	98 10 32	99 31 29
	α Pegasi	W.	75 7 12	76 33 29	77 59 55	79 26 31
	α Arietis	W.	31 37 58	33 5 54	34 34 5	36 2 28
	Pollux	E.	44 34 15	43 6 34	41 38 52	40 11 9
	Regulus	E.	81 8 51	79 39 44	78 10 31	76 41 10
	Sun	E.	115 6 32	113 44 56	112 23 13	111 1 21
25	Fomalhaut	W.	106 16 52	107 38 3	108 59 16	110 20 29
	α Pegasi	W.	86 41 59	88 9 38	89 37 27	91 5 29
	α Arietis	W.	43 27 44	44 57 27	46 27 25	47 57 37
	Pollux	E.	32 52 31	31 24 51	29 57 16	28 29 47
	Regulus	E.	69 12 14	67 41 58	66 11 29	64 40 49
	Sun	E.	104 9 45	102 46 54	101 23 52	100 0 37
26	Fomalhaut	W.	117 6 30	118 27 35	119 48 35	121 9 29
	α Pegasi	W.	98 28 47	99 58 6	101 27 40	102 57 27
	α Arietis	W.	55 32 29	57 4 16	58 36 21	60 8 43
	Aldebaran	W.	23 46 10	25 13 3	26 40 46	28 9 15
	Regulus	E.	57 4 15	55 32 14	53 59 57	52 27 25
	Sun	E.	93 1 0	91 36 20	90 11 24	88 46 11
27	α Pegasi	W.	110 30 5	112 1 22	113 32 53	115 4 40
	α Arietis	W.	67 55 19	69 29 38	71 4 18	72 39 20
	Aldebaran	W.	35 41 17	37 13 23	38 46 1	40 19 9
	Regulus	E.	44 40 30	43 6 13	41 31 39	39 56 45
	Sun	E.	81 35 38	80 8 34	78 41 10	77 13 25
28	α Arietis	W.	80 40 7	82 17 26	83 55 10	85 33 19
	Aldebaran	W.	48 12 14	49 48 18	51 24 50	53 1 51
	Regulus	E.	31 57 33	30 20 46	28 43 42	27 6 20
	Sun	E.	69 49 14	68 19 15	66 48 53	65 18 8
29	α Arietis	W.	93 50 21	95 31 2	97 12 10	98 53 44
	Aldebaran	W.	61 14 3	62 53 55	64 34 15	66 15 4
	Sun	E.	57 38 12	56 4 58	54 31 19	52 57 15
30	α Arietis	W.	107 28 7	109 12 18	110 56 54	112 41 56
	Aldebaran	W.	74 46 8	76 29 44	78 13 47	79 58 17
	Pollux	E.	33 6 17	34 47 55	36 30 15	38 13 14
	Sun	E.	45 0 44	43 24 12	41 47 18	40 10 0

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
1	Aldebaran	W.	88 47 16	90 34 18	92 21 44	94 9 33
	Pollux	W.	46 56 53	48 43 13	50 30 1	52 17 17
	Sun	E.	31 58 20	30 19 5	28 39 36	26 59 56
6	Sun	W.	38 29 5	40 12 16	41 55 14	43 38 0
	α Aquilæ	E.	72 39 48	71 2 6	69 24 57	67 48 21
	Fomalhaut	E.	97 52 7	96 11 15	94 30 32	92 50 2
7	Sun	W.	52 7 58	53 49 5	55 29 53	57 10 21
	α Aquilæ	E.	59 55 28	58 23 15	56 51 56	55 21 35
	Fomalhaut	E.	84 31 33	82 52 51	81 14 32	79 36 39
	α Pegasi	E.	104 49 9	103 3 43	101 18 34	99 33 42
8	Sun	W.	65 27 35	67 5 57	68 43 58	70 21 36
	Venus	W.	27 0 14	28 37 12	30 13 50	31 50 7
	α Aquilæ	E.	48 6 44	46 43 41	45 22 9	44 2 15
	Fomalhaut	E.	71 34 16	69 59 21	68 25 2	66 51 20
	α Pegasi	E.	90 54 13	89 11 22	87 28 53	85 46 47
9	Sun	W.	78 24 13	79 59 38	81 34 40	83 9 21
	Venus	W.	39 46 17	41 20 27	42 54 15	44 27 41
	Antares	W.	27 32 42	29 15 40	30 58 17	32 40 33
	Fomalhaut	E.	59 12 50	57 43 21	56 14 41	54 46 52
	α Pegasi	E.	77 22 6	75 42 23	74 3 4	72 24 11
10	Sun	W.	90 57 18	92 29 50	94 2 2	95 33 53
	Venus	W.	52 9 36	53 40 56	55 11 57	56 42 37
	Antares	W.	41 6 42	42 46 54	44 26 45	46 6 17
	Fomalhaut	E.	47 42 15	46 20 35	45 0 10	43 41 4
	α Pegasi	E.	64 16 9	62 39 52	61 4 2	59 28 39
	α Arietis	E.	106 41 21	105 1 30	103 22 0	101 42 50
11	Sun	W.	103 8 12	104 38 7	106 7 44	107 37 2
	Venus	W.	64 11 10	65 39 58	67 8 27	68 36 39
	Antares	W.	54 19 8	55 56 47	57 34 7	59 11 11
	Fomalhaut	E.	37 28 44	36 19 43	35 12 51	34 8 18
	α Pegasi	E.	51 38 54	50 6 27	48 34 33	47 3 11
	α Arietis	E.	93 31 47	91 54 30	90 17 31	88 40 50
12	Sun	W.	114 59 20	116 26 58	117 54 21	119 21 29
	Venus	W.	75 53 30	77 20 5	78 46 25	80 12 31
	Antares	W.	67 12 17	68 47 43	70 22 53	71 57 50
	α Pegasi	E.	39 35 31	38 8 2	36 41 21	35 15 31
	α Arietis	E.	80 41 36	79 6 33	77 31 45	75 57 13
13	Sun	W.	126 33 29	127 59 11	129 24 40	130 49 56
	Venus	W.	87 19 35	88 44 21	90 8 55	91 33 17
	Antares	W.	79 49 4	81 22 40	82 56 4	84 29 16
	α Arietis	E.	68 8 4	66 34 55	65 1 59	63 29 16
	Aldebaran	E.	100 52 38	99 19 55	97 47 23	96 15 3
14	Venus	W.	98 32 24	99 55 43	101 18 52	102 41 52
	Antares	W.	92 12 29	93 44 37	95 16 35	96 48 23
	α Aquilæ	W.	45 10 5	46 20 50	47 32 25	48 44 45

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
14	*α* Arietis	E.	55 48 39	54 17 6	52 45 44	51 14 33
	Aldebaran	E.	88 36 2	87 4 45	85 33 37	84 2 39
15	Venus	W.	109 34 44	110 56 54	112 18 57	113 40 53
	Antares	W.	104 25 14	105 56 12	107 27 3	108 57 46
	α Aquilæ	W.	54 55 33	56 11 11	57 27 12	58 43 34
	α Arietis	E.	43 41 20	42 11 14	40 41 18	39 11 33
	Aldebaran	E.	76 30 2	74 59 56	73 29 59	72 0 9
16	*α* Aquilæ	W.	65 9 42	66 27 36	67 45 41	69 3 55
	Fomalhaut	W.	40 57 0	42 6 9	43 16 16	44 27 16
	α Arietis	E.	31 45 41	30 17 9	28 48 52	27 20 50
	Aldebaran	E.	64 32 59	63 3 56	61 35 0	60 6 11
	Pollux	E.	106 26 18	104 57 5	103 27 56	101 58 53
17	*α* Aquilæ	W.	75 36 57	76 55 49	78 14 45	79 33 44
	Fomalhaut	W.	50 33 10	51 48 7	53 3 33	54 19 24
	α Pegasi	W.	27 55 54	29 11 57	30 29 3	31 47 5
	Aldebaran	E.	52 43 56	51 15 51	49 47 54	48 20 4
	Pollux	E.	94 34 44	93 6 7	91 37 34	90 9 5
18	*α* Aquilæ	W.	86 9 2	87 28 6	88 47 9	90 6 11
	Fomalhaut	W.	60 44 6	62 1 56	63 20 0	64 38 18
	α Pegasi	W.	38 27 28	39 49 5	41 11 5	42 33 26
	Aldebaran	E.	41 3 0	39 36 2	38 9 15	36 42 39
	Pollux	E.	82 47 35	81 19 27	79 51 22	78 23 20
19	*α* Aquilæ	W.	96 40 41	97 59 24	99 18 2	100 36 34
	Fomalhaut	W.	71 12 35	72 31 54	73 51 21	75 10 55
	α Pegasi	W.	49 29 21	50 53 12	52 17 13	53 41 25
	Aldebaran	E.	29 33 2	28 7 59	26 43 18	25 19 4
	Pollux	E.	71 3 50	69 36 3	68 8 18	66 40 36
20	*α* Aquilæ	W.	107 7 37	108 25 25	109 43 3	111 0 31
	Fomalhaut	W.	81 50 12	83 10 18	84 30 28	85 50 41
	α Pegasi	W.	60 44 35	62 9 35	63 34 43	64 59 57
	Pollux	E.	59 22 28	57 54 55	56 27 23	54 59 53
	Regulus	E.	96 7 2	94 38 35	93 10 7	91 41 37
	Jupiter	E.	116 23 12	114 56 28	113 29 42	112 2 54
	Saturn	E.	116 22 16	114 55 4	113 27 50	112 0 34
21	Fomalhaut	W.	92 32 28	93 52 55	95 13 24	96 33 54
	α Pegasi	W.	72 7 43	73 33 35	74 59 34	76 25 38
	α Arietis	W.	28 34 22	30 1 36	31 29 2	32 56 40
	Pollux	E.	47 42 39	46 15 16	44 47 55	43 20 35
	Regulus	E.	84 18 41	82 49 58	81 21 12	79 52 22
	Saturn	E.	104 43 35	103 16 1	101 48 23	100 20 41
	Jupiter	E.	104 48 17	103 21 12	101 54 3	100 26 50
22	Fomalhaut	W.	103 16 27	104 36 57	105 57 25	107 17 51
	α Pegasi	W.	83 37 36	85 4 20	86 31 11	87 58 9
	α Arietis	W.	40 17 26	41 46 5	43 14 54	44 43 52
	Pollux	E.	36 4 32	34 37 31	33 10 35	31 43 47
	Regulus	E.	72 27 5	70 57 45	69 28 20	67 58 48

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
22	Saturn	E.	93 0 58	91 32 44	90 4 24	88 35 57
	Jupiter	E.	93 9 32	91 41 47	90 13 56	88 45 58
23	*a* Pegasi	W.	95 14 55	96 42 42	98 10 36	99 38 39
	a Arietis	W.	52 11 16	53 41 17	55 11 30	56 41 55
	Aldebaran	W.	20 30 34	21 54 28	23 19 20	24 45 2
	Regulus	E.	60 29 18	58 58 59	57 28 30	55 57 52
	Saturn	E.	81 11 45	79 42 28	78 13 2	76 43 26
	Jupiter	E.	81 24 11	79 55 23	78 26 26	76 57 18
	Sun	E.	123 9 18	121 46 31	120 23 33	119 0 24
24	*a* Pegasi	W.	107 1 15	108 30 15	109 59 26	111 28 46
	a Arietis	W.	64 17 7	65 48 51	67 20 49	68 53 2
	Aldebaran	W.	32 3 14	33 32 27	35 2 9	36 32 16
	Regulus	E.	48 22 3	46 50 19	45 18 23	43 46 14
	Saturn	E.	69 12 42	67 41 57	66 10 59	64 39 48
	Jupiter	E.	69 28 52	67 58 35	66 28 4	64 57 19
	Sun	E.	112 1 37	110 37 12	109 12 33	107 47 38
25	*a* Arietis	W.	76 38 10	78 12 3	79 46 15	81 20 45
	Aldebaran	W.	44 9 3	45 41 36	47 14 32	48 47 51
	Regulus	E.	36 2 10	34 28 41	32 54 58	31 21 1
	Saturn	E.	57 0 19	55 27 40	53 54 45	52 21 34
	Jupiter	E.	57 19 58	55 47 43	54 15 12	52 42 24
	Sun	E.	100 39 9	99 12 36	97 45 45	96 18 35
26	*a* Arietis	W.	89 18 14	90 54 46	92 31 41	94 8 57
	Aldebaran	W.	56 40 20	58 16 1	59 52 7	61 28 38
	Regulus	E.	23 28 17	21 53 16	20 18 12	18 43 9
	Saturn	E.	44 31 33	42 56 42	41 21 35	39 46 1[illegible]
	Jupiter	E.	44 54 4	43 19 31	41 44 40	40 9 31
	Sun	E.	88 57 49	87 28 37	85 59 3	84 29 7
27	Aldebaran	W.	69 37 26	71 16 29	72 55 58	74 35 53
	Pollux	W.	28 11 20	29 47 17	31 24 1	33 1 30
	Saturn	E.	31 45 30	30 8 45	28 31 51	26 54 51
	Jupiter	E.	32 9 30	30 32 43	28 55 44	27 18 34
	Sun	E.	76 53 37	75 21 19	73 48 36	72 15 28
28	Aldebaran	W.	83 2 6	84 44 41	86 27 42	88 11 11
	Pollux	W.	41 19 0	43 0 21	44 42 16	46 24 45
	Sun	E.	64 23 24	62 47 42	61 11 33	59 34 58
29	Aldebaran	W.	96 55 9	98 41 15	100 27 46	102 14 41
	Pollux	W.	55 5 9	56 50 46	58 36 52	60 23 27
	Sun	E.	51 25 38	49 46 30	48 6 57	46 27 1
30	Aldebaran	W.	111 15 11	113 4 23	114 53 54	116 43 45
	Pollux	W.	69 23 6	71 12 18	73 1 54	74 51 52
	Regulus	W.	32 21 20	34 10 38	36 0 24	37 50 37
	Sun	E.	38 1 39	36 19 32	34 37 7	32 54 25
31	Pollux	W.	84 6 53	85 58 48	87 50 58	89 43 22
	Regulus	W.	47 7 30	48 59 54	50 52 35	52 45 32
	Sun	E.	24 17 45	22 34 4	20 50 26	19 6 55

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
4	Sun	W.	32 59 58	34 42 46	36 25 17	38 7 31
	a Aquilæ	E.	52 29 11	50 58 36	49 29 18	48 1 24
	Fomalhaut	E.	76 39 48	75 0 0	73 20 42	71 41 58
	a Pegasi	E.	96 15 50	94 28 9	92 40 48	90 53 47
5	Sun	W.	46 33 29	48 13 34	49 53 14	51 32 30
	a Aquilæ	E.	41 6 46	39 49 46	38 35 8	37 23 2
	Fomalhaut	E.	63 37 35	62 2 50	60 28 53	58 55 46
	a Pegasi	E.	82 4 28	80 19 51	78 35 42	76 52 0
6	Sun	W.	59 42 33	61 19 16	62 55 34	64 31 25
	Fomalhaut	E.	51 24 21	49 57 16	48 31 23	47 6 47
	a Pegasi	E.	68 20 47	66 40 4	64 59 52	63 20 13
7	Sun	W.	72 24 16	73 57 34	75 30 26	77 2 54
	Venus	W.	28 55 36	30 27 53	31 59 46	33 31 15
	Fomalhaut	E.	40 25 45	39 10 40	37 57 33	36 46 34
	a Pegasi	E.	55 10 19	53 34 6	51 58 29	50 23 29
	a Arietis	E.	97 16 49	95 36 12	93 56 1	92 16 13
8	Sun	W.	84 39 14	86 9 21	87 39 5	89 8 27
	Venus	W.	41 2 45	42 31 54	44 0 41	45 29 6
	a Pegasi	E.	42 38 34	41 7 46	39 37 46	38 8 36
	a Arietis	E.	84 3 21	82 25 56	80 48 55	79 12 15
9	Sun	W.	96 30 7	97 57 28	99 24 31	100 51 15
	Venus	W.	52 46 5	54 12 30	55 38 36	57 4 25
	a Pegasi	E.	30 57 34	29 34 53	28 13 39	26 54 2
	a Arietis	E.	71 14 13	69 39 37	68 5 21	66 31 23
	Aldebaran	E.	104 1 19	102 27 10	100 53 18	99 19 44
10	Sun	W.	108 0 43	109 25 49	110 50 41	112 15 18
	Venus	W.	64 9 16	65 33 28	66 57 25	68 21 8
	a Arietis	E.	58 45 57	57 13 42	55 41 43	54 9 59
	Aldebaran	E.	91 36 0	90 4 1	88 32 17	87 0 46
11	Sun	W.	119 15 12	120 38 35	122 1 47	123 24 49
	Venus	W.	75 16 33	76 39 3	78 1 22	79 23 32
	a Aquilæ	W.	52 24 20	53 39 13	54 54 32	56 10 14
	a Arietis	E.	46 34 55	45 4 35	43 34 29	42 4 36
	Aldebaran	E.	79 26 28	77 56 13	76 26 8	74 56 14
12	Sun	W.	130 17 37	131 39 45	133 1 46	134 23 39
	Venus	W.	86 12 4	87 33 23	88 54 34	90 15 39
	a Aquilæ	W.	62 33 23	63 50 45	65 8 19	66 26 4
	Fomalhaut	W.	38 50 42	39 57 3	41 4 33	42 13 7
	a Arietis	E.	34 38 20	33 9 44	31 41 21	30 13 13
	Aldebaran	E.	67 29 11	66 0 14	64 31 25	63 2 44
13	Venus	W.	96 59 38	98 20 11	99 40 40	101 1 6
	a Aquilæ	W.	72 56 59	74 15 30	75 34 7	76 52 49
	Fomalhaut	W.	48 8 56	49 22 13	50 36 4	51 50 28
	Aldebaran	E.	55 41 10	54 13 13	52 45 22	51 17 38
	Pollux	E.	97 31 3	96 2 45	94 34 30	93 6 19

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
14	Venus	W.	107 42 29	109 2 39	110 22 46	111 42 53
	α Aquilæ	W.	83 27 9	84 46 8	86 5 9	87 24 11
	Fomalhaut	W.	58 9 7	59 25 58	60 43 7	62 0 35
	α Pegasi	W.	35 41 54	37 2 31	38 23 38	39 45 12
	Aldebaran	E.	44 0 36	42 33 33	41 6 37	39 39 49
	Pollux	E.	85 46 6	84 18 10	82 50 16	81 22 23
15	α Aquilæ	W.	93 59 17	95 18 15	96 37 11	97 56 4
	Fomalhaut	W.	68 31 35	69 50 25	71 9 27	72 28 38
	α Pegasi	W.	46 38 23	48 1 54	49 25 38	50 49 37
	Aldebaran	E.	32 28 11	31 2 27	29 36 58	28 11 47
	Pollux	E.	74 3 19	72 35 33	71 7 47	69 40 1
16	α Aquilæ	W.	104 29 32	105 47 57	107 6 16	108 24 28
	Fomalhaut	W.	79 6 46	80 26 46	81 46 52	83 7 4
	α Pegasi	W.	57 52 20	59 17 23	60 42 34	62 7 55
	Pollux	E.	62 21 16	60 53 31	59 25 47	57 58 2
	Regulus	E.	99 7 27	97 38 51	96 10 12	94 41 31
17	Fomalhaut	W.	89 49 14	91 9 51	92 30 31	93 51 12
	α Pegasi	W.	69 16 34	70 42 40	72 8 52	73 35 11
	Pollux	E.	50 39 17	49 11 33	47 43 50	46 16 7
	Regulus	E.	87 17 24	85 48 25	84 19 23	82 50 17
	Saturn	E.	110 9 40	108 41 42	107 13 39	105 45 32
	Jupiter	E.	112 20 54	110 53 20	109 25 42	107 57 59
18	α Pegasi	W.	80 48 25	82 15 22	83 42 26	85 9 36
	α Arietis	W.	37 23 55	38 52 39	40 21 33	41 50 35
	Pollux	E.	38 58 5	37 30 37	36 3 15	34 35 59
	Regulus	E.	75 23 48	73 54 17	72 24 41	70 55 0
	Saturn	E.	98 23 46	96 55 10	95 26 28	93 57 41
	Jupiter	E.	100 38 15	99 10 3	97 41 45	96 13 22
19	α Pegasi	W.	92 26 57	93 54 43	95 22 36	96 50 34
	α Arietis	W.	49 17 56	50 47 50	52 17 52	53 48 3
	Pollux	E.	27 22 9	25 56 10	24 30 36	23 5 33
	Regulus	E.	63 25 16	61 55 2	60 24 42	58 54 15
	Saturn	E.	86 32 17	85 2 53	83 33 23	82 3 46
	Jupiter	E.	88 49 57	87 20 57	85 51 50	84 22 37
20	α Arietis	W.	61 21 13	62 52 19	64 23 35	65 55 0
	Aldebaran	W.	29 8 58	30 37 8	32 5 45	33 34 46
	Regulus	E.	51 20 21	49 49 13	48 17 57	46 46 33
	Saturn	E.	74 33 52	73 3 30	71 32 59	70 2 20
	Jupiter	E.	76 54 35	75 24 35	73 54 26	72 24 8
	Mars	E.	112 40 32	111 14 19	109 47 55	108 21 22
21	α Arietis	W.	73 34 49	75 7 20	76 40 4	78 12 59
	Aldebaran	W.	41 5 8	42 36 10	44 7 30	45 39 8
	Regulus	E.	39 7 37	37 35 26	36 3 7	34 30 40
	Saturn	E.	62 26 53	60 55 19	59 23 35	57 51 41
	Jupiter	E.	64 50 20	63 19 5	61 47 39	60 16 3
	Mars	E.	101 6 2	99 38 24	98 10 35	96 42 34
	Sun	E.	130 52 45	129 27 34	128 2 10	126 36 35

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
22	α Arietis	W.	86 0 50	87 35 6	89 9 35	90 44 20
	Aldebaran	W.	53 21 35	54 54 56	56 28 34	58 2 30
	Regulus	E.	26 46 39	25 13 36	23 40 30	22 7 24
	Saturn	E.	50 9 37	48 36 40	47 3 33	45 30 14
	Jupiter	E.	52 35 14	51 2 29	49 29 32	47 56 24
	Spica	E.	80 33 58	78 59 24	77 24 36	75 49 34
	Mars	E.	89 19 16	87 49 56	86 20 22	84 50 32
	Sun	E.	119 25 18	117 58 21	116 31 9	115 3 42
23	α Arietis	W.	98 41 58	100 18 18	101 54 56	103 31 52
	Aldebaran	W.	65 56 35	67 32 19	69 8 22	70 44 44
	Pollux	W.	24 44 53	26 16 18	27 48 33	29 21 35
	Saturn	E.	37 41 11	36 6 55	34 32 30	32 57 59
	Jupiter	E.	40 7 38	38 33 17	36 58 45	35 24 3
	Spica	E.	67 50 26	66 13 47	64 36 51	62 59 37
	Mars	E.	77 17 30	75 46 5	74 14 22	72 42 22
	Sun	E.	107 42 26	106 13 20	104 43 57	103 14 15
24	Aldebaran	W.	78 51 30	80 29 52	82 8 34	83 47 38
	Pollux	W.	37 16 25	38 53 5	40 30 15	42 7 56
	Saturn	E.	25 4 55	23 30 34	21 56 31	20 22 54
	Jupiter	E.	27 28 24	25 53 3	24 17 44	22 42 32
	Spica	E.	54 48 50	53 9 43	51 30 16	49 50 29
	Mars	E.	64 57 46	63 23 54	61 49 42	60 15 11
	Sun	E.	95 41 3	94 9 25	92 37 27	91 5 8
25	Aldebaran	W.	92 8 18	93 49 32	95 31 8	97 13 6
	Pollux	W.	50 23 27	52 3 56	53 44 51	55 26 14
	Spica	E.	41 26 25	39 44 34	38 2 21	36 19 47
	Mars	E.	52 17 31	50 40 57	49 4 3	47 26 48
	Sun	E.	83 18 10	81 43 40	80 8 47	78 33 32
26	Pollux	W.	63 59 36	65 43 33	67 27 56	69 12 43
	Regulus	W.	26 58 19	28 41 59	30 26 11	32 10 55
	Mars	E.	39 15 33	37 36 20	35 56 49	34 17 0
	Sun	E.	70 31 30	68 53 56	67 15 59	65 37 39
27	Pollux	W.	78 2 41	79 49 51	81 37 23	83 25 17
	Regulus	W.	41 1 45	42 49 15	44 37 10	46 25 29
	Mars	E.	25 54 30	24 13 32	22 32 34	20 51 41
	Sun	E.	57 20 16	55 39 41	53 58 44	52 17 26
28	Pollux	W.	92 29 54	94 19 46	96 9 55	98 0 20
	Regulus	W.	55 32 38	57 23 6	59 13 53	61 4 58
	Saturn	W.	32 19 32	34 7 16	35 55 33	37 44 20
	Jupiter	W.	29 19 27	31 6 52	32 54 50	34 43 18
	Sun	E.	43 45 55	42 2 41	40 19 10	38 35 23
29	Pollux	W.	107 15 56	109 7 38	110 59 28	112 51 26
	Regulus	W.	70 24 18	72 16 51	74 9 35	76 2 29
	Saturn	W.	46 54 17	48 45 15	50 36 29	52 27 58
	Jupiter	W.	43 51 45	45 42 25	47 33 22	49 24 32
	Sun	E.	29 52 59	28 7 57	26 22 46	24 37 28

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
4	Sun	W.	39 40 28	41 18 36	42 56 18	44 33 34
	Fomalhaut	E.	44 43 54	43 20 50	41 59 27	40 39 55
	α Pegasi	E.	60 21 1	58 39 34	56 58 42	55 18 26
	α Arietis	E.	102 42 7	100 56 44	99 11 47	97 27 16
5	Sun	W.	52 33 16	54 7 52	55 42 1	57 15 44
	Fomalhaut	E.	34 34 51	33 29 36	32 27 26	31 28 35
	α Pegasi	E.	47 6 58	45 30 49	43 55 26	42 20 52
	α Arietis	E.	88 51 25	87 9 35	85 28 12	83 47 17
6	Sun	W.	64 57 47	66 28 54	67 59 37	69 29 55
	α Pegasi	E.	34 41 48	33 13 10	31 45 46	30 19 44
	α Arietis	E.	75 29 15	73 50 56	72 13 3	70 35 35
	Aldebaran	E.	108 17 26	106 39 39	105 2 16	103 25 17
7	Sun	W.	76 55 34	78 23 35	79 51 13	81 18 31
	Venus	W.	30 36 40	32 3 7	33 29 19	34 55 14
	α Arietis	E.	62 34 19	60 59 14	59 24 31	57 50 10
	Aldebaran	E.	95 26 2	93 51 17	92 16 53	90 42 49
8	Sun	W.	88 30 5	89 55 29	91 20 36	92 45 26
	α Aquilæ	W.	49 27 27	50 42 30	51 58 1	53 13 58
	Venus	W.	42 0 54	43 25 16	44 49 23	46 13 16
	α Arietis	E.	50 3 42	48 31 24	46 59 26	45 27 46
	Aldebaran	E.	82 57 28	81 25 19	79 53 28	78 21 53
9	Sun	W.	99 45 50	101 9 14	102 32 25	103 55 24
	α Aquilæ	W.	59 38 32	60 56 10	62 14 0	63 32 0
	Venus	W.	53 9 18	54 31 54	55 54 18	57 16 32
	α Arietis	E.	37 53 58	36 24 5	34 54 29	33 25 11
	Aldebaran	E.	70 47 56	69 17 53	67 48 3	66 18 25
10	Sun	W.	110 47 44	112 9 45	113 31 38	114 53 23
	α Aquilæ	W.	70 3 46	71 22 24	72 41 6	73 59 51
	Venus	W.	64 5 17	65 26 37	66 47 50	68 8 57
	Fomalhaut	W.	45 36 58	46 48 52	48 1 26	49 14 36
	Aldebaran	E.	58 53 18	57 24 50	55 56 31	54 28 22
	Pollux	E.	100 41 38	99 12 57	97 44 23	96 15 55
11	Sun	W.	121 40 40	123 1 54	124 23 3	125 44 9
	α Aquilæ	W.	80 34 12	81 53 9	83 12 7	84 31 6
	Venus	W.	74 53 8	76 13 46	77 34 20	78 54 52
	Fomalhaut	W.	55 27 56	56 43 51	58 0 7	59 16 42
	Aldebaran	E.	47 9 55	45 42 39	44 15 32	42 48 33
	Pollux	E.	88 55 5	87 27 9	85 59 17	84 31 28
12	Sun	W.	132 29 10	133 50 7	135 11 4	136 32 2
	α Aquilæ	W.	91 5 59	92 24 56	93 43 52	95 2 47
	Venus	W.	85 37 6	86 57 31	88 17 56	89 38 22
	Fomalhaut	W.	65 43 51	67 2 0	68 20 22	69 38 56
	α Pegasi	W.	43 36 44	44 59 36	46 22 45	47 46 10
	Aldebaran	E.	35 35 52	34 9 50	32 44 0	31 18 22
	Pollux	E.	77 12 59	75 45 22	74 17 46	72 50 10

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XV^h.	XVIII^h.	XXI^h.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
13	Venus	W.	96 20 56	97 41 34	99 2 15	100 23 0
	Fomalhaut	W.	76 14 29	77 34 4	78 53 48	80 13 40
	α Pegasi	W.	54 46 37	56 11 19	57 36 12	59 1 15
	Pollux	E.	65 32 6	64 4 27	62 36 47	61 9 5
	Regulus	E.	102 20 21	100 51 54	99 23 24	97 54 50
14	Venus	W.	107 7 44	108 28 55	109 50 12	111 11 34
	Fomalhaut	W.	86 54 51	88 15 25	89 36 4	90 56 49
	α Pegasi	W.	66 9 4	67 35 6	69 1 18	70 27 39
	Pollux	E.	53 50 9	52 22 17	50 54 22	49 26 26
	Regulus	E.	90 31 1	89 2 0	87 32 55	86 3 44
15	α Pegasi	W.	77 41 36	79 8 50	80 36 12	82 3 43
	α Arietis	W.	34 13 28	35 42 21	37 11 26	38 40 43
	Pollux	E.	42 6 29	40 38 29	39 10 29	37 42 32
	Regulus	E.	78 36 19	77 6 30	75 36 35	74 6 33
	Saturn	E.	103 1 22	101 32 13	100 2 56	98 33 32
	Jupiter	E.	106 56 53	105 27 59	103 58 58	102 29 49
16	α Pegasi	W.	89 23 20	90 51 40	92 20 8	93 48 44
	α Arietis	W.	46 9 52	47 40 13	49 10 46	50 41 28
	Pollux	E.	30 23 57	28 56 40	27 29 39	26 2 56
	Regulus	E.	66 34 36	65 3 50	63 32 57	62 1 55
	Saturn	E.	91 4 33	89 34 21	88 4 1	86 33 33
	Jupiter	E.	95 2 4	93 32 6	92 2 0	90 31 45
17	α Pegasi	W.	101 13 32	102 42 50	104 12 16	105 41 48
	α Arietis	W.	58 17 32	59 49 15	61 21 8	62 53 11
	Regulus	E.	54 24 52	52 53 4	51 21 8	49 49 5
	Saturn	E.	78 59 5	77 27 46	75 56 18	74 24 42
	Jupiter	E.	82 58 22	81 27 16	79 56 0	78 24 36
18	α Arietis	W.	70 35 58	72 9 2	73 42 16	75 15 41
	Aldebaran	W.	38 8 31	39 39 50	41 11 27	42 43 21
	Regulus	E.	42 6 53	40 34 5	39 1 9	37 28 7
	Saturn	E.	66 44 34	65 12 7	63 39 32	62 6 48
	Jupiter	E.	70 45 19	69 13 0	67 40 33	66 7 56
	Spica	E.	96 2 44	94 29 20	92 55 46	91 22 2
19	α Arietis	W.	83 5 19	84 39 46	86 14 24	87 49 13
	Aldebaran	W.	50 26 49	52 0 15	53 33 55	55 7 49
	Regulus	E.	29 41 36	28 8 6	26 34 34	25 1 3
	Saturn	E.	54 21 5	52 47 33	51 13 53	49 40 5
	Jupiter	E.	58 22 39	56 49 9	55 15 30	53 41 42
	Spica	E.	83 30 51	81 56 5	80 21 10	78 46 3
	Mars	E.	110 6 39	108 37 3	107 7 17	105 37 19
20	α Arietis	W.	95 46 1	97 21 57	98 58 3	100 34 22
	Aldebaran	W.	63 0 43	64 35 58	66 11 26	67 47 7
	Pollux	W.	22 0 53	23 30 27	25 1 0	26 32 25
	Saturn	E.	41 49 29	40 15 5	38 40 36	37 6 5
	Jupiter	E.	45 50 37	44 16 0	42 41 16	41 6 25
	Spica	E.	70 47 48	69 11 35	67 35 11	65 58 36

GREENWICH MEAN TIME.

LUNAR DISTANCES.

Day of the Month.	Star's Name and Position.		Midnight.	XVh.	XVIIIh.	XXIh.
			° ′ ″	° ′ ″	° ′ ″	° ′ ″
20	Mars	E.	98 4 41	96 33 35	95 2 17	93 30 47
21	Aldebaran	W.	75 48 55	77 25 57	79 3 12	80 40 41
	Pollux	W.	34 19 13	35 54 9	37 29 31	39 5 18
	Saturn	E.	29 13 20	27 38 59	26 4 50	24 30 57
	Jupiter	E.	33 10 47	31 35 29	30 0 11	28 24 55
	Spica	E.	57 52 39	56 14 51	54 36 51	52 58 38
	Mars	E.	85 50 14	84 17 29	82 44 32	81 11 21
	Sun	E.	126 6 3	124 35 40	123 5 4	121 34 16
22	Aldebaran	W.	88 51 34	90 30 27	92 9 34	93 48 56
	Pollux	W.	47 9 52	48 47 49	50 26 6	52 4 42
	Jupiter	E.	20 31 5	18 57 31	17 24 44	15 53 4
	Spica	E.	44 44 18	43 4 47	41 25 2	39 45 4
	Mars	E.	73 22 6	71 47 34	70 12 47	68 37 46
	Sun	E.	113 56 47	112 24 35	110 52 9	109 19 28
23	Pollux	W.	60 22 25	62 2 52	63 43 38	65 24 41
	Regulus	W.	23 22 28	25 2 12	26 42 27	28 23 9
	Spica	E.	31 21 56	29 40 40	27 59 11	26 17 32
	Mars	E.	60 39 1	59 2 31	57 25 46	55 48 46
	Sun	E.	101 32 18	99 58 6	98 23 38	96 48 54
24	Pollux	W.	73 54 26	75 37 15	77 20 22	79 3 46
	Regulus	W.	36 52 46	38 35 48	40 19 9	42 2 51
	Mars	E.	47 39 56	46 1 25	44 22 38	42 43 37
	Sun	E.	88 51 12	87 14 51	85 38 13	84 1 19
25	Pollux	W.	87 45 1	89 30 5	91 15 26	93 1 2
	Regulus	W.	50 46 7	52 31 42	54 17 34	56 3 43
	Saturn	W.	26 45 37	28 27 40	30 10 24	31 53 45
	Jupiter	W.	22 21 27	24 2 44	25 44 50	27 27 40
	Mars	E.	34 24 58	32 44 34	31 3 59	29 23 13
	Sun	E.	75 52 40	74 14 7	72 35 18	70 56 13
26	Pollux	W.	101 52 46	103 39 49	105 27 6	107 14 34
	Regulus	W.	64 58 39	66 46 25	68 34 26	70 22 41
	Saturn	W.	40 38 7	42 24 16	44 10 47	45 57 38
	Jupiter	W.	36 10 21	37 56 15	39 42 33	41 29 11
	Mars	E.	20 57 35	19 16 23	17 35 19	15 54 32
	Sun	E.	62 36 57	60 56 20	59 15 30	57 34 27
27	Regulus	W.	79 27 15	81 16 45	83 6 26	84 56 16
	Saturn	W.	54 56 24	56 44 56	58 33 41	60 22 38
	Jupiter	W.	50 27 4	52 15 26	54 4 2	55 52 50
	Spica	W.	25 25 43	27 14 50	29 4 12	30 53 48
	Sun	E.	49 5 58	47 23 42	45 41 15	43 58 40
28	Regulus	W.	94 7 25	95 57 57	97 48 33	99 39 12
	Saturn	W.	69 29 56	71 19 48	73 9 44	74 59 46
	Jupiter	W.	64 59 25	66 49 9	68 38 58	70 28 51
	Spica	W.	40 4 33	41 55 6	43 45 45	45 36 29
	Sun	E.	35 23 44	33 40 27	31 57 5	30 13 41

1861. AT GREENWICH MEAN TIME. 1861.

JANUARY.		FEBRUARY.		MARCH.		APRIL.	
Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.
	h. m.		h. m.		h. m.		h. m.
1	5 7·4	1	4 22·6	1	3 44·5	1	3 6·1
2	5 5·9	2	4 21·2	2	3 43·2	2	3 4·9
3	5 4·4	3	4 19·8	3	3 41·9	3	3 3·7
4	5 3·0	4	4 18·4	4	3 40·6	4	3 2·5
5	5 1·5	5	4 17·0	5	3 39·3	5	3 1·4
6	5 0·1	6	4 15·6	6	3 38·0	6	3 0·2
7	4 58·6	7	4 14·2	7	3 36·7	7	2 59·1
8	4 57·1	8	4 12·9	8	3 35·5	8	2 57·9
9	4 55·7	9	4 11·5	9	3 34·2	9	2 56·8
10	4 54·2	10	4 10·1	10	3 32·9	10	2 55·6
11	4 52·8	11	4 8·7	11	3 31·7	11	2 54·5
12	4 51·3	12	4 7·3	12	3 30·4	12	2 53·4
13	4 49·9	13	4 5·9	13	3 29·1	13	2 52·2
14	4 48·4	14	4 4·6	14	3 27·9	14	2 51·1
15	4 47·0	15	4 3·2	15	3 26·6	15	2 49·9
16	4 45·5	16	4 1·9	16	3 25·4	16	2 48·8
17	4 44·1	17	4 0·5	17	3 24·1	17	2 47·7
18	4 42·6	18	3 59·2	18	3 22·9	18	2 46·6
19	4 41·2	19	3 57·8	19	3 21·7	19	2 45·5
20	4 39·7	20	3 56·5	20	3 20·4	20	2 44·3
21	4 38·3	21	3 55·1	21	3 19·2	21	2 43·2
22	4 36·9	22	3 53·8	22	3 18·0	22	2 42·1
23	4 35·4	23	3 52·4	23	3 16·8	23	2 41·0
24	4 34·0	24	3 51·1	24	3 15·6	24	2 39·9
25	4 32·6	25	3 49·8	25	3 14·4	25	2 38·8
26	4 31·2	26	3 48·5	26	3 13·2	26	2 37·7
27	4 29·7	27	3 47·1	27	3 12·0	27	2 36·6
		28	3 45·8				
28	4 28·3			28	3 10·8	28	2 35·5
29	4 26·9	29	3 44·5	29	3 9·6	29	2 34·4
30	4 25·5			30	3 8·4	30	2 33·3
31	4 24·1			31	3 7·2	31	2 32·2
32	4 22·0			32	3 6·1		

1861. AT GREENWICH MEAN TIME. 1861.

MAY.		JUNE.		JULY.		AUGUST.	
Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.
	h. m.		h. m.		h. m.		h. m.
1	2 32·2	1	1 58·1	1	1 22·5	1	0 41·1
2	2 31·1	2	1 56·9	2	1 21·3	2	0 39·7
3	2 30·0	3	1 55·8	3	1 20·0	3	0 38·2
4	2 28·9	4	1 54·7	4	1 18·8	4	0 36·8
5	2 27·8	5	1 53·5	5	1 17·5	5	0 35·4
6	2 26·7	6	1 52·4	6	1 16·2	6	0 33·9
7	2 25·6	7	1 51·2	7	1 14·9	7	0 32·5
8	2 24·5	8	1 50·1	8	1 13·6	8	0 31·1
9	2 23·4	9	1 48·9	9	1 12·4	9	0 29·6
10	2 22·3	10	1 47·8	10	1 11·0	10	0 28·1
11	2 21·2	11	1 46·6	11	1 9·7	11	0 26·7
12	2 20·2	12	1 45·5	12	1 8·4	12	0 25·2
13	2 19·1	13	1 44·3	13	1 7·1	13	0 23·7
14	2 18·0	14	1 43·1	14	1 5·8	14	0 22·3
15	2 16·9	15	1 42·0	15	1 4·5	15	0 20·8
16	2 15·8	16	1 40·8	16	1 3·1	16	0 19·3
17	2 14·7	17	1 39·6	17	1 1·8	17	0 17·8
18	2 13·6	18	1 38·4	18	1 0·5	18	0 16·3
19	2 12·5	19	1 37·2	19	0 59·1	19	0 14·8
20	2 11·4	20	1 36·0	20	0 57·8	20	0 13·3
21	2 10·3	21	1 34·8	21	0 56·4	21	0 11·8
22	2 9·2	22	1 33·6	22	0 55·0	22	0 10·3
23	2 8·1	23	1 32·4	23	0 53·7	23	0 8·8
24	2 7·0	24	1 31·2	24	0 52·3	24	0 7·3
25	2 5·9	25	1 30·0	25	0 50·9	25	0 5·7
26	2 4·8	26	1 28·7	26	0 49·5	26	0 4·2
27	2 3·6	27	1 27·5	27	0 48·1	27	0 2·7
28	2 2·5	28	1 26·3	28	0 46·7	28	{0 1·2 / 23 59·6}
29	2 1·4	29	1 25·0	29	0 45·3	29	23 58·1
30	2 0·3	30	1 23·8	30	0 43·9	30	23 56·5
31	1 59·2	31	1 22·5	31	0 42·5	31	23 55·0
32	1 58·1			32	0 41·1	32	23 53·5

1861.	AT GREENWICH MEAN TIME.						1861.
SEPTEMBER.		**OCTOBER.**		**NOVEMBER.**		**DECEMBER.**	
Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.
	h. m.		h. m.		h. m.		h. m.
1	23 53·5	1	23 6·2	1	22 17·7	1	21 33·8
2	23 51·9	2	23 4·7	2	22 16·2	2	21 32·4
3	23 50·4	3	23 3·1	3	22 14·7	3	21 31·0
4	23 48·8	4	23 1·5	4	22 13·1	4	21 29·6
5	23 47·2	5	22 59·9	5	22 11·6	5	21 28·3
6	23 45·7	6	22 58·3	6	22 10·1	6	21 26·9
7	23 44·1	7	22 56·7	7	22 8·6	7	21 25·6
8	23 42·6	8	22 55·2	8	22 7·1	8	21 24·2
9	23 41·0	9	22 53·6	9	22 5·6	9	21 22·9
10	23 39·4	10	22 52·0	10	22 4·1	10	21 21·5
11	23 37·9	11	22 50·4	11	22 2·6	11	21 20·2
12	23 36·3	12	22 48·8	12	22 1·1	12	21 18·9
13	23 34·7	13	22 47·3	13	21 59·6	13	21 17·5
14	23 33·1	14	22 45·7	14	21 58·1	14	21 16·2
15	23 31·6	15	22 44·1	15	21 56·7	15	21 14·9
16	23 30·0	16	22 42·5	16	21 55·2	16	21 13·6
17	23 28·4	17	22 41·0	17	21 53·7	17	21 12·4
18	23 26·8	18	22 39·4	18	21 52·3	18	21 11·1
19	23 25·2	19	22 37·8	19	21 50·8	19	21 9·8
20	23 23·7	20	22 36·3	20	21 49·4	20	21 8·5
21	23 22·1	21	22 34·7	21	21 47·9	21	21 7·2
22	23 20·5	22	22 33·1	22	21 46·5	22	21 6·0
23	23 18·9	23	22 31·6	23	21 45·0	23	21 4·7
24	23 17·3	24	22 30·0	24	21 43·6	24	21 3·5
25	23 15·7	25	22 28·5	25	21 42·2	25	21 2·3
26	23 14·2	26	22 26·9	26	21 40·8	26	21 1·0
27	23 12·6	27	22 25·4	27	21 39·4	27	20 59·8
28	23 11·0	28	22 23·8	28	21 38·0	28	20 58·6
29	23 9·4	29	22 22·3	29	21 36·6	29	20 57·4
30	23 7·8	30	22 20·7	30	21 35·2	30	20 56·2
		31	22 19·2			31	20 55·0
31	23 6·2			31	21 33·8		
		32	22 17·7			32	20 53·8

JANUARY, 1861.						
MEAN TIME.						
Day of the Month.	GEOCENTRIC.					
	Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N.13	38	45	15	8·8
2	13	40	18	15	4·6
3	13	41	54	15	0·4
4	13	43	33	14	56·2
5	13	45	17	14	52·0
6	13	47	3	14	47·8
7	13	48	52	14	43·5
8	13	50	45	14	39·3
9	13	52	41	14	35·0
10	13	54	40	14	30·8
11	13	56	42	14	26·5
12	13	58	47	14	22·2
13	14	0	54	14	17·9
14	14	3	4	14	13·6
15	14	5	17	14	9·3
16	14	7	32	14	5·0
17	14	9	50	14	0·6
18	14	12	10	13	56·3
19	14	14	32	13	51·9
20	14	16	56	13	47·6
21	14	19	21	13	43·2
22	14	21	49	13	38·8
23	14	24	19	13	34·5
24	14	26	50	13	30·1
25	14	29	22	13	25·7
26	14	31	56	13	21·3
27	14	34	32	13	16·9
28	14	37	8	13	12·5
29	14	39	46	13	8·1
30	14	42	24	13	3·6
31	14	45	4	12	59·2
32	N.14	47	44	12	54·8

FEBRUARY, 1861.					
MEAN TIME.					
Day of the Month.	GEOCENTRIC.				
	Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N.14	47	44	12	54·8
2	14	50	25	12	50·4
3	14	53	6	12	45·9
4	14	55	47	12	41·5
5	14	58	29	12	37·1
6	15	1	11	12	32·6
7	15	3	53	12	28·2
8	15	6	35	12	23·7
9	15	9	17	12	19·3
10	15	11	58	12	14·8
11	15	14	39	12	10·4
12	15	17	19	12	5·9
13	15	19	58	12	1·5
14	15	22	36	11	57·0
15	15	25	14	11	52·6
16	15	27	50	11	48·1
17	15	30	25	11	43·7
18	15	32	59	11	39·3
19	15	35	31	11	34·8
20	15	38	2	11	30·4
21	15	40	31	11	26·0
22	15	42	59	11	21·6
23	15	45	24	11	17·1
24	15	47	48	11	12·7
25	15	50	10	11	8·3
26	15	52	30	11	3·9
27	15	54	48	10	59·5
28	15	57	3	10	55·1
29	N.15	59	17	10	50·8

MARCH, 1861.						APRIL, 1861.					
MEAN TIME.						MEAN TIME.					
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.		Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.		°	′	″	h.	m.
1	N.15	59	17	10	50·8	1	N.16	43	39	8	39·2
2	16	1	27	10	46·4	2	16	44	12	8	35·2
3	16	3	36	10	42·0	3	16	44	40	8	31·1
4	16	5	42	10	37·6	4	16	45	6	8	27·1
5	16	7	45	10	33·3	5	16	45	27	8	23·1
6	16	9	45	10	28·9	6	16	45	46	8	19·0
7	16	11	43	10	24·6	7	16	46	0	8	15·0
8	16	13	38	10	20·2	8	16	46	11	8	11·1
9	16	15	31	10	15·9	9	16	46	19	8	7·1
10	16	17	20	10	11·6	10	16	46	23	8	3·1
11	16	19	6	10	7·3	11	16	46	24	7	59·2
12	16	20	49	10	3·0	12	16	46	21	7	55·2
13	16	22	29	9	58·7	13	16	46	14	7	51·3
14	16	24	6	9	54·4	14	16	46	4	7	47·4
15	16	25	40	9	50·2	15	16	45	51	7	43·5
16	16	27	11	9	45·9	16	16	45	34	7	39·6
17	16	28	38	9	41·7	17	16	45	14	7	35·7
18	16	30	2	9	37·4	18	16	44	50	7	31·8
19	16	31	22	9	33·2	19	16	44	23	7	28·0
20	16	32	40	9	29·0	20	16	43	52	7	24·1
21	16	33	54	9	24·8	21	16	43	18	7	20·3
22	16	35	4	9	20·6	22	16	42	41	7	16·5
23	16	36	11	9	16·4	23	16	42	0	7	12·7
24	16	37	15	9	12·2	24	16	41	16	7	8·9
25	16	38	15	9	8·0	25	16	40	29	7	5·1
26	16	39	12	9	3·9	26	16	39	39	7	1·3
27	16	40	5	8	59·8	27	16	38	45	6	57·5
28	16	40	55	8	55·6	28	16	37	48	6	53·8
29	16	41	41	8	51·5	29	16	36	48	6	50·0
30	16	42	24	8	47·4	30	16	35	45	6	46·3
31	16	43	3	8	43·3	31	N.16	34	39	6	42·6
32	N.16	43	39	8	39·2						

MAY, 1861.							JUNE, 1861.						
MEAN TIME.							MEAN TIME.						
Day of the Month.	GEOCENTRIC.						Day of the Month.	GEOCENTRIC.					
	Apparent Declination. Noon.			Meridian Passage.				Apparent Declination. Noon.			Meridian Passage.		
	°	′	″	h.	m.			°	′	″	h.	m.	
1	N.16	34	39	6	42·6		1	N.15	35	47	4	52·4	
2	16	33	29	6	38·9		2	15	33	9	4	49·0	
3	16	32	16	6	35·2		3	15	30	30	4	45·6	
4	16	31	0	6	31·5		4	15	27	47	4	42·2	
5	16	29	41	6	27·9		5	15	25	2	4	38·8	
6	16	28	19	6	24·2		6	15	22	15	4	35·4	
7	16	26	53	6	20·5		7	15	19	25	4	32·0	
8	16	25	25	6	16·9		8	15	16	33	4	28·7	
9	16	23	54	6	13·3		9	15	13	39	4	25·3	
10	16	22	19	6	9·7		10	15	10	42	4	21·9	
11	16	20	42	6	6·0		11	15	7	43	4	18·6	
12	16	19	1	6	2·4		12	15	4	41	4	15·2	
13	16	17	18	5	58·8		13	15	1	38	4	11·9	
14	16	15	32	5	55·3		14	14	58	32	4	8·6	
15	16	13	43	5	51·7		15	14	55	24	4	5·3	
16	16	11	51	5	48·1		16	14	52	13	4	1·9	
17	16	9	56	5	44·6		17	14	49	1	3	58·6	
18	16	7	58	5	41·0		18	14	45	46	3	55·3	
19	16	5	57	5	37·5		19	14	42	30	3	52·0	
20	16	3	54	5	34·0		20	14	39	11	3	48·7	
21	16	1	48	5	30·5		21	14	35	50	3	45·5	
22	15	59	39	5	27·0		22	14	32	27	3	42·2	
23	15	57	28	5	23·5		23	14	29	2	3	38·9	
24	15	55	14	5	20·0		24	14	25	35	3	35·6	
25	15	52	57	5	16·5		25	14	22	6	3	32·4	
26	15	50	38	5	13·1		26	14	18	35	3	29·1	
27	15	48	16	5	9·6		27	14	15	2	3	25·8	
28	15	45	51	5	6·2		28	14	11	27	3	22·6	
29	15	43	24	5	2·7		29	14	7	50	3	19·3	
30	15	40	54	4	59·3		30	14	4	11	3	16·1	
31	15	38	22	4	55·8		31	N.14	0	31	3	12·9	
32	N.15	35	47	4	52·4								

JULY, 1861.

MEAN TIME.

Day of the Month.	Geocentric. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N. 14	0	31	3	12·9
2	13	56	48	3	9·6
3	13	53	4	3	6·4
4	13	49	18	3	3·2
5	13	45	30	3	0·0
6	13	41	40	2	56·7
7	13	37	49	2	53·5
8	13	33	55	2	50·3
9	13	30	0	2	47·1
10	13	26	4	2	43·9
11	13	22	5	2	40·7
12	13	18	6	2	37·5
13	13	14	4	2	34·3
14	13	10	1	2	31·2
15	13	5	56	2	28·0
16	13	1	50	2	24·8
17	12	57	43	2	21·6
18	12	53	34	2	18·4
19	12	49	23	2	15·2
20	12	45	11	2	12·1
21	12	40	58	2	8·9
22	12	36	43	2	5·8
23	12	32	27	2	2·6
24	12	28	10	1	59·4
25	12	23	51	1	56·3
26	12	19	31	1	53·1
27	12	15	10	1	50·0
28	12	10	47	1	46·8
29	12	6	24	1	43·7
30	12	1	59	1	40·5
31	11	57	32	1	37·4
32	N. 11	53	5	1	34·3

AUGUST, 1861.

MEAN TIME.

Day of the Month.	Geocentric. Apparent Declination. Noon.			Meridian Passage.	
	°	′	″	h.	m.
1	N. 11	53	5	1	34·3
2	11	48	36	1	31·1
3	11	44	7	1	28·0
4	11	39	36	1	24·8
5	11	35	4	1	21·7
6	11	30	32	1	18·6
7	11	25	58	1	15·4
8	11	21	23	1	12·3
9	11	16	47	1	9·2
10	11	12	11	1	6·1
11	11	7	33	1	2·9
12	11	2	55	0	59·8
13	10	58	16	0	56·7
14	10	53	36	0	53·6
15	10	48	56	0	50·5
16	10	44	14	0	47·3
17	10	39	32	0	44·2
18	10	34	50	0	41·1
19	10	30	6	0	38·0
20	10	25	22	0	34·9
21	10	20	37	0	31·7
22	10	15	52	0	28·6
23	10	11	6	0	25·5
24	10	6	20	0	22·4
25	10	1	33	0	19·3
26	9	56	46	0	16·1
27	9	51	58	0	13·0
28	9	47	10	0	9·9
29	9	42	22	0	6·8
30	9	37	33	0	3·7
31	9	32	43	{0 23	0·6} 57·5}
32	N. 9	27	54	23	54·3

SEPTEMBER 1861.							OCTOBER, 1861.						
MEAN TIME.							MEAN TIME.						
Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.				Meridian Passage.		Day of the Month.	GEOCENTRIC. Apparent Declination. Noon.				Meridian Passage.	
		°	′	″	h.	m.			°	′	″	h.	m.
1	N.	9	27	54	23	54·3	1	N.	7	3	38	22	20·2
2		9	23	4	23	51·2	2		6	58	56	22	17·1
3		9	18	14	23	48·1	3		6	54	15	22	13·9
4		9	13	24	23	45·0	4		6	49	35	22	10·7
5		9	8	33	23	41·9	5		6	44	55	22	7·6
6		9	3	43	23	38·7	6		6	40	17	22	4·4
7		8	58	52	23	35·6	7		6	35	39	22	1·2
8		8	54	2	23	32·5	8		6	31	3	21	58·0
9		8	49	11	23	29·4	9		6	26	27	21	54·8
10		8	44	20	23	26·2	10		6	21	53	21	51·6
11		8	39	30	23	23·1	11		6	17	20	21	48·4
12		8	34	39	23	20·0	12		6	12	48	21	45·3
13		8	29	49	23	16·9	13		6	8	17	21	42·1
14		8	24	59	23	13·7	14		6	3	48	21	38·8
15		8	20	9	23	10·6	15		5	59	19	21	35·6
16		8	15	19	23	7·5	16		5	54	52	21	32·4
17		8	10	29	23	4·4	17		5	50	27	21	29·2
18		8	5	40	23	1·2	18		5	46	3	21	26·0
19		8	0	51	22	58·1	19		5	41	40	21	22·8
20		7	56	2	22	54·9	20		5	37	19	21	19·6
21		7	51	14	22	51·8	21		5	32	59	21	16·3
22		7	46	26	22	48·6	22		5	28	41	21	13·1
23		7	41	39	22	45·5	23		5	24	25	21	9·8
24		7	36	52	22	42·3	24		5	20	10	21	6·6
25		7	32	5	22	39·2	25		5	15	56	21	3·3
26		7	27	19	22	36·0	26		5	11	45	21	0·1
27		7	22	33	22	32·9	27		5	7	35	20	56·8
28		7	17	49	22	29·7	28		5	3	27	20	53·5
29		7	13	4	22	26·6	29		4	59	21	20	50·3
30		7	8	21	22	23·4	30		4	55	17	20	47·0
							31		4	51	15	20	43·7
31	N.	7	3	38	22	20·2							
							32	N.	4	47	15	20	40·4

NOVEMBER, 1861.

MEAN TIME.

Day of the Month.	Geocentric Apparent Declination. Noon. °	′	″	Meridian Passage. h.	m.
1	N. 4	47	15	20	40·4
2	4	43	17	20	37·1
3	4	39	21	20	33·9
4	4	35	27	20	30·6
5	4	31	35	20	27·3
6	4	27	46	20	24·0
7	4	23	59	20	20·6
8	4	20	14	20	17·3
9	4	16	32	20	14·0
10	4	12	52	20	10·6
11	4	9	15	20	7·3
12	4	5	40	20	3·9
13	4	2	7	20	0·5
14	3	58	37	19	57·2
15	3	55	10	19	53·8
16	3	51	46	19	50·4
17	3	48	24	19	47·0
18	3	45	5	19	43·7
19	3	41	49	19	40·3
20	3	38	36	19	36·8
21	3	35	25	19	33·4
22	3	32	17	19	30·0
23	3	29	13	19	26·6
24	3	26	11	19	23·1
25	3	23	13	19	19·7
26	3	20	18	19	16·3
27	3	17	26	19	12·8
28	3	14	37	19	9·3
29	3	11	51	19	5·9
30	3	9	9	19	2·4
31	N. 3	6	30	18	58·9

DECEMBER, 1861.

MEAN TIME.

Day of the Month.	Geocentric Apparent Declination. Noon. °	′	″	Meridian Passage. h.	m.
1	N. 3	6	30	18	58·9
2	3	3	55	18	55·4
3	3	1	23	18	51·9
4	2	58	55	18	48·4
5	2	56	30	18	44·8
6	2	54	9	18	41·3
7	2	51	51	18	37·7
8	2	49	38	18	34·2
9	2	47	27	18	30·6
10	2	45	21	18	27·0
11	2	43	19	18	23·5
12	2	41	20	18	19·9
13	2	39	25	18	16·3
14	2	37	34	18	12·6
15	2	35	47	18	9·0
16	2	34	4	18	5·4
17	2	32	25	18	1·7
18	2	30	50	17	58·1
19	2	29	19	17	54·4
20	2	27	52	17	50·7
21	2	26	29	17	47·1
22	2	25	11	17	43·4
23	2	23	57	17	39·7
24	2	22	47	17	36·0
25	2	21	41	17	32·2
26	2	20	40	17	28·5
27	2	19	43	17	24·7
28	2	18	50	17	21·0
29	2	18	2	17	17·2
30	2	17	19	17	13·4
31	2	16	40	17	9·6
32	N. 2	16	5	17	5·8

1861.	AT GREENWICH MEAN TIME.						1861.
JANUARY.		**FEBRUARY.**		**MARCH.**		**APRIL.**	
Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.
	h. m.		h. m.		h. m.		h. m.
1	15 59·4	1	13 52·1	1	11 53·9	1	9 43·9
2	15 55·4	2	13 47·9	2	11 49·7	2	9 39·8
3	15 51·4	3	13 43·7	3	11 45·5	3	9 35·7
4	15 47·3	4	13 39·5	4	11 41·2	4	9 31·5
5	15 43·3	5	13 35·3	5	11 37·0	5	9 27·4
6	15 39·2	6	13 31·1	6	11 32·8	6	9 23·3
7	15 35·2	7	13 26·9	7	11 28·6	7	9 19·2
8	15 31·1	8	13 22·7	8	11 24·3	8	9 15·1
9	15 27·1	9	13 18·5	9	11 20·1	9	9 11·0
10	15 23·0	10	13 14·2	10	11 15·9	10	9 6·9
11	15 18·9	11	13 10·0	11	11 11·7	11	9 2·8
12	15 14·8	12	13 5·8	12	11 7·4	12	8 58·7
13	15 10·7	13	13 1·6	13	11 3·2	13	8 54·7
14	15 6·6	14	12 57·4	14	10 59·0	14	8 50·6
15	15 2·5	15	12 53·2	15	10 54·8	15	8 46·5
16	14 58·4	16	12 48·9	16	10 50·6	16	8 42·5
17	14 54·3	17	12 44·7	17	10 46·4	17	8 38·4
18	14 50·2	18	12 40·5	18	10 42·2	18	8 34·4
19	14 46·1	19	12 36·2	19	10 38·1	19	8 30·4
20	14 42·0	20	12 32·0	20	10 33·9	20	8 26·3
21	14 37·9	21	12 27·8	21	10 29·7	21	8 22·3
22	14 33·7	22	12 23·6	22	10 25·5	22	8 18·3
23	14 29·6	23	12 19·3	23	10 21·3	23	8 14·3
24	14 25·4	24	12 15·1	24	10 17·1	24	8 10·3
25	14 21·3	25	12 10·9	25	10 13·0	25	8 6·3
26	14 17·1	26	12 6·6	26	10 8·8	26	8 2·3
27	14 13·0	27	12 2·4	27	10 4·6	27	7 58·3
		28	11 58·2				
28	14 8·8			28	10 0·5	28	7 54·4
29	14 4·6	29	11 53·9	29	9 56·3	29	7 50·4
30	14 0·4			30	9 52·2	30	7 46·4
31	13 56·2			31	9 48·0		
						31	7 42·5
32	13 52·1			32	9 43·9		

1861. AT GREENWICH MEAN TIME. 1861.

MAY.		JUNE.		JULY.		AUGUST.	
Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.
	h. m.		h. m.		h. m.		h. m.
1	7 42·5	1	5 43·1	1	3 52·9	1	2 2·9
2	7 38·5	2	5 39·3	2	3 49·3	2	1 59·4
3	7 34·6	3	5 35·6	3	3 45·7	3	1 55·9
4	7 30·6	4	5 31·8	4	3 42·1	4	1 52·4
5	7 26·7	5	5 28·1	5	3 38·5	5	1 48·9
6	7 22·8	6	5 24·4	6	3 34·9	6	1 45·4
7	7 18·9	7	5 20·7	7	3 31·3	7	1 42·0
8	7 14·9	8	5 17·0	8	3 27·8	8	1 38·5
9	7 11·0	9	5 13·2	9	3 24·2	9	1 35·0
10	7 7·1	10	5 9·5	10	3 20·6	10	1 31·5
11	7 3·3	11	5 5·8	11	3 17·1	11	1 28·0
12	6 59·4	12	5 2·1	12	3 13·5	12	1 24·5
13	6 55·5	13	4 58·4	13	3 10·0	13	1 21·1
14	6 51·6	14	4 54·8	14	3 6·4	14	1 17·6
15	6 47·8	15	4 51·1	15	3 2·8	15	1 14·1
16	6 43·9	16	4 47·4	16	2 59·3	16	1 10·6
17	6 40·1	17	4 43·7	17	2 55·7	17	1 7·1
18	6 36·2	18	4 40·1	18	2 52·2	18	1 3·7
19	6 32·4	19	4 36·4	19	2 48·7	19	1 0·2
20	6 28·6	20	4 32·8	20	2 45·1	20	0 56·7
21	6 24·7	21	4 29·1	21	2 41·6	21	0 53·3
22	6 20·9	22	4 25·5	22	2 38·1	22	0 49·8
23	6 17·1	23	4 21·8	23	2 34·5	23	0 46·3
24	6 13·3	24	4 18·2	24	2 31·0	24	0 42·9
25	6 9·5	25	4 14·6	25	2 27·5	25	0 39·4
26	6 5·7	26	4 10·9	26	2 24·0	26	0 35·9
27	6 1·9	27	4 7·3	27	2 20·5	27	0 32·5
28	5 58·1	28	4 3·7	28	2 17·0	28	0 29·0
29	5 54·4	29	4 0·1	29	2 13·4	29	0 25·5
30	5 50·6	30	3 56·5	30	2 9·9	30	0 22·1
31	5 46·8	31	3 52·9	31	2 6·4	31	0 18·6
32	5 43·1			32	2 2·9	32	0 15·1

1861. AT GREENWICH MEAN TIME. 1861.

SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.	Day of the Month.	GEOCENTRIC. Meridian Passage.
	h. m.		h. m.		h. m.		h. m.
1	0 15·1	1	22 27·5	1	20 38·2	1	18 48·7
2	0 11·7	2	22 24·0	2	20 34·6	2	18 45·0
3	0 8·2	3	22 20·5	3	20 31·0	3	18 41·3
4	0 4·7	4	22 17·0	4	20 27·4	4	18 37·5
5	{0 1·3 23 57·8}	5	22 13·5	5	20 23·8	5	18 33·8
6	23 54·3	6	22 10·0	6	20 20·2	6	18 30·0
7	23 50·9	7	22 6·6	7	20 16·6	7	18 26·3
8	23 47·4	8	22 3·1	8	20 13·0	8	18 22·5
9	23 43·9	9	21 59·6	9	20 9·4	9	18 18·7
10	23 40·5	10	21 56·0	10	20 5·8	10	18 15·0
11	23 37·0	11	21 52·5	11	20 2·2	11	18 11·2
12	23 33·5	12	21 49·0	12	19 58·6	12	18 7·4
13	23 30·1	13	21 45·5	13	19 54·9	13	18 3·6
14	23 26·6	14	21 42·0	14	19 51·3	14	17 59·8
15	23 23·2	15	21 38·5	15	19 47·7	15	17 56·0
16	23 19·7	16	21 35·0	16	19 44·0	16	17 52·2
17	23 16·2	17	21 31·4	17	19 40·4	17	17 48·4
18	23 12·7	18	21 27·9	18	19 36·7	18	17 44·5
19	23 9·3	19	21 24·4	19	19 33·1	19	17 40·7
20	23 5·8	20	21 20·8	20	19 29·4	20	17 36·9
21	23 2·3	21	21 17·3	21	19 25·7	21	17 33·0
22	22 58·9	22	21 13·8	22	19 22·1	22	17 29·1
23	22 55·4	23	21 10·2	23	19 18·4	23	17 25·3
24	22 51·9	24	21 6·7	24	19 14·7	24	17 21·4
25	22 48·4	25	21 3·1	25	19 11·0	25	17 17·5
26	22 44·9	26	20 59·6	26	19 7·3	26	17 13·6
27	22 41·5	27	20 56·0	27	19 3·6	27	17 9·8
28	22 38·0	28	20 52·4	28	18 59·9	28	17 5·9
29	22 34·5	29	20 48·9	29	18 56·2	29	17 2·0
30	22 31·0	30	20 45·3	30	18 52·5	30	16 58·0
		31	20 41·7			31	16 54·1
31	22 27·5			31	18 48·7		
		32	20 38·2			32	16 50·2

LATITUDES AND LONGITUDES OF PUBLIC OBSERVATORIES.

*** The Longitudes are reckoned from the Meridian of Greenwich.

Observatory		Position	Authority
ALTONA	Lat.	53° 32′ 45″·3 N.	*Gauss on the Latitudes of Göttingen and Altona*, page 71. (Göttingen, 1828.)
	Long.	0h 39m 46s ·14E.	*Expédition Chronométrique exécutée entre Altona et Greenwich, &c.* (St. Petersburg, 1845.)
ARMAGH	Lat.	54° 21′ 12″·7 N.	Communicated by Rev. Dr. Robinson.
	Long.	0h 26m 35s ·5 W.	
ATHENS	Lat.	37° 58′ 20″ N.	*Ast. Nach.* vol. xxxiii. page 197.
	Long.	1h 34m 55s ·7 E.	*Ergänzungs-Heft zu den Ast. Nach.* 1849, page 151.
BERLIN	Lat.	52° 30′ 16″·7 N.	*Berliner Astron. Jahrbuch*, 1852, page 289.
	Long.	0h 53m 35s ·5 E.	
BILK	Lat.	51° 12′ 25″ N.	*Ast. Nach.* vol. xxvii. page 300.
	Long.	0h 27m 5s ·5 E.	
BONN	Lat.	50° 44′ 9″·1 N.	*Ast. Nach.* vol. xviii. page 135.
	Long.	0h 28m 27s ·0 E.	
BRESLAU	Lat.	51° 6′ 56″·0 N.	*Berliner Astron. Jahrbuch*, 1852, page 289.
	Long.	1h 8m 10s ·0 E.	
BRUSSELS	Lat.	50° 51′ 10″·7 N.	*Annuaire de l'Observatoire de Bruxelles, pour l'An* 1837, pages 264 and 265.
	Long.	0h 17m 28s ·90E.	Communicated by G. B. Airy, Esq.
BUDA	(Ofen.)		
	Lat.	47° 29′ 12″·2 N.	*Mem. Ast. Soc.* vol. i. page 280.
	Long.	1h 16m 12s ·7 E.	*Zach's Corresp. Astron.* vol. vii. p. 263.
CAMBRIDGE	Lat.	52° 12′ 51″·8 N.	*Camb. Phil. Trans.* vol. v. p. 279.
	Long.	0h 0m 23s ·54E.	*Camb. Phil. Trans.* vol. iii. p. 168.
CAMBRIDGE, U. S.	Lat.	42° 22′ 49″ N.	*Monthly Notices of the Royal Ast. Soc.* vol. vii. p. 157.
	Long.	4h 44m 32s W.	
CAPE OF GOOD HOPE	Lat.	33° 56′ 3″ S.	*Mem. Roy. Ast. Soc.* vol. vi. p. 130.
	Long.	1h 13m 55s ·0 E.	Communicated by Mr. Henderson.
CHRISTIANIA	Lat.	59° 54′ 42″·4 N.	*Ast. Nach.* vol. xii. p. 283.
	Long.	0h 42m 53s ·9 E.	*Berliner Astron. Jahrbuch*, 1852, p. 289.
COPENHAGEN	(University.)		
	Lat.	55° 40′ 53″·0 N.	*Ast. Nach.* vol. v. page 366.
	Long.	0h 50m 19s ·8 E.	*Ast. Nach.* vol. xix. page 120.
CRACOW	Lat.	50° 3′ 50″·0 N.	*Ast. Nach.* vol. xvi. page 256.
	Long.	1h 19m 51s ·1 E.	*Ast. Nach.* vol. xvi. page 352; and vol. xviii. page 392.

LATITUDES AND LONGITUDES OF PUBLIC OBSERVATORIES.

DORPAT	Lat. 58° 22′ 47″·1 N.	*Struve's Astronom. Observations,* vol. vi. page 60.
	Long. 1ʰ 46ᵐ 55ˢ ·0 E.	*Bessel's Tabulæ Regiomontanæ,* p. 2.
DUBLIN	Lat. 53° 23′ 13″ N. Long. 0ʰ 25ᵐ 22ˢ W.	*Ast. Nach.* vol. x. page 274.
DURHAM	Lat. 54° 46′ 6″·2 N. Long. 0ʰ 6ᵐ 19ˢ ·75 W.	Communicated by Prof. Chevallier.
EDINBURGH	Lat. 55° 57′ 23″·2 N.	*Ast. Soc. Not.* vol. iii. page 201.
	Long. 0ʰ 12ᵐ 43ˢ ·6 W.	*Mem. Ast. Soc.* vol. iv. page 568.
GENEVA	Lat. 46° 11′ 59″·4 N.	*Mémoire sur une nouvelle détermination sur la Latitude de Genève.* By M. Gautier. (Genève, 1830.)
	Long. 0ʰ 24ᵐ 37ˢ ·7 E.	*Ast. Nach.* vol. xx. page 7.
GEORGETOWN COLLEGE, D. C. (U. S.)	Lat. 38° 54′ 26″·1 N.	*Annals of the Astronomical Observatory of Georgetown College,* D. C. No. I. p. 215.
	Long. 5ʰ 8ᵐ 18ˢ ·15 W.	*Do. Do.* p. 186.
GOTHA	(Seeberg.) Lat. 50° 56′ 5″ N.	*Gauss on the Latitudes of Göttingen and Altona,* p. 80.
	Long. 0ʰ 42ᵐ 56ˢ ·4 E.	*Bessel's Tabulæ Regiomontanæ,* p. 2.
GÖTTINGEN	Lat. 51° 31′ 48″ N.	*Gauss on the Latitudes of Göttingen and Altona,* p. 71.
	Long. 0ʰ 39ᵐ 46ˢ ·5 E.	*Bessel's Tabulæ Regiomontanæ,* p. 2.
GREENWICH	Lat. 51° 28′ 38″·2 N.	*Greenwich Observations,* 1843, p. lvii.
	Long. 0ʰ 0ᵐ 0ˢ	
HAMBURGH	Lat. 53° 33′ 5″·0 N.	*Ast. Nach.* vol. vii. page 379.
	Long. 0ʰ 39ᵐ 54ˢ ·1 E.	*Berliner Astron. Jahrbuch,* 1852, page 289.
KAZAN	Lat. 55° 47′ 23″·1 N.	*Ast. Nach.* vol. xxviii. page 47.
	Long. 3ʰ 16ᵐ 26ˢ ·3 E.	*Conn. des Temps,* 1855, page 376.
KÖNIGSBERG	Lat. 54° 42′ 50″·7 N.	*Ast. Nach.* vol. xxix. p. 72.
	Long. 1ʰ 22ᵐ 0ˢ ·5 E.	*Bessel's Tab. Regiomontanæ,* p. 2.
KREMSMUNSTER	Lat. 48° 3′ 23″·8 N.	*Ast. Nach.* vol. xxxvii. p. 271.
	Long. 0ʰ 56ᵐ 32ˢ ·8 E.	*Ast. Nach.* vol. xxxvii. p. 269.
LEIPSIC	Lat. 51° 20′ 20″·1 N. Long. 0ʰ 49ᵐ 28ˢ ·5 E.	*Berliner Astron. Jahrbuch,* 1852, page 289.
LEYDEN	Lat. 52° 9′ 28″·2 N. Long. 0ʰ 17ᵐ 57ˢ ·5 E.	*Ast. Nach.* vol. xvii. page 100.
LIVERPOOL	Lat. 53 24′ 47″·8 N.	Communicated by J. Hartnup, Esq.
	Long. 0ʰ 12ᵐ 0ˢ ·11 W.	——————— G. B. Airy, Esq.

LATITUDES AND LONGITUDES OF PUBLIC OBSERVATORIES.

MADRAS	Lat. 13° 4′ 9″·2 N. Long. 5h 21m 3s ·77E.	*Taylor's Results of Astron. Obs. at the Observatory*, vol. i. 1831, pp. 94, 95. (Madras, 1832.)
MANHEIM	Lat. 49° 29′ 14″ N.	*Zach's Corresp. Astron.* vol. i. p. 193.
	Long. 0h 33m 51s ·4 E.	*Ast. Nach.* vol. ii. page 398.
MARBURG	Lat. 50° 48′ 46″·9 N. Long. 0h 35m 5s ·6 E.	*Ast. Nach.* vol. xx. page 27.
MARSEILLES	Lat. 43° 17′ 50″·1 N.	*Zach's Attraction des Montagnes*, vol. ii. p. 591.
	Long. 0h 21m 29s ·0 E.	*Ast. Nach.* vol. iv. p. 36.
MILAN	(Brera.)	
	Lat. 45° 28′ 1″ N.	*Zach's Corres. Astron.* vol. v. p. 300.
	Long. 0h 36m 47s ·2 E.	*Ast. Nach.* vol. ix. p. 312.
MODENA	Lat. 44° 38′ 53″ N. Long. 0h 43m 43s ·2 E.	*Effem. Astron. di Milano* for 1829, pp. 94 and 60.
MOSCOW	Lat. 55° 45′ 19″·8 N. Long. 2h 30m 16s ·96E.	*Ast. Nach.* vol. xxvii. page 215.
MUNICH	(Bogenhausen.)	
	Lat. 48° 8′ 45″ N.	*Ast. Nach.* vol. i. p. 221.
	Long. 0h 46m 26s ·5 E.	*Ast. Nach.* vol. viii. p. 148.
NAPLES	(Capo di Monte.)	
	Lat. 40° 51′ 46″·6 N.	*Ast. Nach.* vol. v. page 294.
	Long. 0h 57m 0s ·3 E.	Communicated by M. Cacciatore to Captain B. Hall, R. N.
NICOLÆFF	Lat. 46° 58′ 20″·6 N.	*Ast. Nach.* vol. vii. p. 261.
	Long. 2h 7m 55s ·1 E.	*Ast. Nach.* vol. vii. p. 306.
OXFORD	Lat. 51° 45′ 36″·0 N. Long. 0h 5m 2s ·6 W.	Communicated by M. J. Johnson, Esq.
PADUA	Lat. 45° 24′ 2″ N.	*Ast. Nach.* vol. v. p. 411.
	Long. 0h 47m 29s ·2 E.	*Ast. Nach.* vol. iv. p. 347.
PALERMO	Lat. 38° 6′ 44″ N.	*Cacciatore*, in Books 7 and 8 of *Palermo Observations.*
	Long. 0h 53m 25s ·6 E.	Communicated by M. Cacciatore to Captain B. Hall, R. N.
PARIS	Lat. 48° 50′ 13″ N.	*Conn. des Temps*, 1853, page 353.
	Long. 0h 9m 20s ·63E.	Communicated by G. B. Airy, Esq.
PETERSBURG	(Academy of Sciences.)	
	Lat. 59° 56′ 29″·7 N. Long. 2h 1m 13s .5 E.	*Description de l'Observatoire Astron. Central de Poulkova*, p. 292.
PORTSMOUTH	Lat. 50° 48′ 3″ N. Long. 0h 4m 23s ·9 W.	*Requisite Tables*, 3d edit. (from Trig. Survey.)

LATITUDES AND LONGITUDES OF PUBLIC OBSERVATORIES.

PRAGUE	Lat. 50° 5′ 18″·5 N. Long. 0^h 57^m 41^s·9 E.	*Ast. Nach.* vol. viii. p. 198. *Ast. Nach.* vol. iii. page 264.
PULKOWA	Lat. 59° 46′ 18″·7 N. Long. 2^h 1^m 18^s.66E.	*Description de l'Observatoire Astron. Central de Poulkova,* p. 290.
ROME	(Roman College.) Lat. 41° 53′ 52″·2 N. Long. 0^h 49^m 54^s·7 E.	*Mem. dell' Osserv. dell' Universita Gregoriana del Collegio Romano,* 1851, p. 17.
ST. FERNANDO, near CADIZ.	Lat. 36° 27′ 45″ N. Long. 0^h 24^m 49^s·1 W.	*Zach's Corresp. Astron.* vol. xiv. pp. 240–243. *Ast. Nach.* vol. ix. p. 358.
STOCKHOLM	Lat. 59° 20′ 31″·0 N. Long. 1^h 12^m 14^s·8 E.	*Conn. des Temps,* 1840, page 344. *Ast. Nach.* vol. xi. p. 408.
TURIN	(New Observatory.) Lat. 45° 4′ 6″ N. Long. 0^h 30^m 48^s·4 E.	Communicated by M. Plana to Capt. B. Hall, R. N.
UPSALA	Lat. 59° 51′ 50″·0 N. Long. 1^h 10^m 34^s·8 E.	*Conn des Temps,* 1840, p. 344. *Ast. Nach.* vol. xi. p. 409.
VENICE	Lat. 45° 25′ 49″·5 N. Long. 0^h 49^m 25^s·4 E.	*Berliner Astron. Jahrbuch,* 1852, page 290.
VIENNA	Lat. 48° 12′ 35″ N. Long. 1^h 5^m 31^s·9 E.	*Littrow's Astronomical Observations,* Part viii. p. 124. *Ast. Nach.* vol. iii. p. 64.
WARSAW	Lat. 52° 13′ 5″·0 N. Long. 1^h 24^m 8^s·5 E.	*Additions to Conn. des Temps,* 1846, pp. 30, 31.
WASHINGTON	(National Observatory.) Lat. 38° 53′ 38″·6 N. Long. 5^h 8^m 12^s·0 W.	*Roy. Ast. Soc. Monthly Notices,* vol. x. page 180.
WILNA	Lat. 54° 41′ 0″ N. Long. 1^h 41^m 11^s·9 E.	*Ast. Nach.* vol. iv. page 562. *Ast. Nach.* vol. viii. p. 96.

LATITUDES AND LONGITUDES OF PRIVATE OBSERVATORIES.

Birr Castle	(The Earl of Rosse.)	Lat. $53°\ 5'\ 47''$ N.	Long. $0^h\ 31^m\ 40^s\cdot9$ W.	Communicated by the Earl of Rosse.
Bradstones (Liverpool.)	(W. Lassell, Esq.)	Lat. $53°\ 25'\ 28''$ N.	Long. $0^h\ 11^m\ 38^s\cdot7$ W.	Communicated by W. Lassell, Esq.
Hartwell	(Dr. Lee.)	Lat. $51°\ 48'\ 36''$ N.	Long. $0^h\ 3^m\ 24^s\cdot33$ W.	Communicated by Dr. Lee.
Haverhill	(W. W. Boreham, Esq.)	Lat. $52°\ 5'\ 22''\cdot8$ N.	Long. $0^h\ 1^m\ 46^s\cdot4$ E.	Communicated by W. W. Boreham, Esq.
Kensington	(Sir James South.)	Lat. $51°\ 30'\ 11''\cdot6$ N.	Long. $0^h\ 0^m\ 46^s\cdot8$ W.	Communicated by Sir James South.
Markree	(E. J. Cooper, Esq.)	Lat. $54°\ 10'\ 36''$ N.	Long. $0^h\ 33^m\ 48^s\cdot4$ W.	Communicated by E. J. Cooper, Esq.
Olmutz	(Herr v. Unkrechtsberg.)	Lat. $49°\ 35'\ 40''$ N.	Long. $1^h\ 9^m\ 0^s\cdot1$ E.	*Ast. Nach.* vol. xxxvii. page 77.
Redhill	(R. C. Carrington, Esq.)	Lat. $51°\ 14'\ 25''\cdot3$ N.	Long. $0^h\ 0^m\ 41^s\cdot25$ W.	Communicated by R. C. Carrington, Esq.
Regent's Park	(George Bishop, Esq.)	Lat. $51°\ 31'\ 29''\cdot9$ N.	Long. $0^h\ 0^m\ 37^s\cdot1$ W.	Communicated by George Bishop, Esq.
Senftenberg	(Baron v. Senftenberg.)	Lat. $50°\ 5'\ 10''$ N.	Long. $1^h\ 5^m\ 50^s\cdot5$ E.	*Ast. Nach.* vol. xxxi. page 173.
Stone (Aylesbury)	(Rev. J. B. Reade.)	Lat. $51°\ 47'\ 57''\cdot0$ N.	Long. $0^h\ 3^m\ 29^s\cdot09$ W.	Communicated by Rev. J. B. Reade.
Tarn Bank	(Isaac Fletcher, Esq.)	Lat. $54°\ 39'\ 13''\cdot7$ N.	Long. $0^h\ 13^m\ 44^s\cdot52$ W.	Communicated by Isaac Fletcher, Esq.
Wateringbury	(Rev. W. R. Dawes.)	Lat. $51°\ 15'\ 12''$ N.	Long. $0^h\ 1^m\ 39^s\cdot8$ E.	Communicated by Rev. W. R. Dawes.
Wrottesley Hall	(Lord Wrottesley.)	Lat. $52°\ 37'\ 2''\cdot3$ N.	Long. $0^h\ 8^m\ 53^s\cdot57$ W.	Communicated by Lord Wrottesley.

DIRECTIONS

FOR DEFINING THE POSITION OF SOME OF THE FIXED STARS AND CONSTELLATIONS,

FOR THE

PURPOSES OF LATITUDE AND LONGITUDE.

Ursa Major, the Great Bear, is the most conspicuous Northern Constellation. There are seven bright stars in it between the first and third magnitudes. The two stars in the body most distant from the tail, are usually called the Pointers, from their pointing to the Pole Star, which is distant 29°. About 46° south from the Pole Star, and about 48° west of the northern pointer, bearing a little to the south, is *Capella*, and a line from the Pole Star through *Capella* will pass through *Rigel*, which is distant from *Capella* 54°. A line running S. W. from *Capella* will pass through the Pleiades, at the distance of about 28°, and nearly through *Menkar*, which is 23° distant from that nebulous cluster. About 7½° E. b. S. from *Capella* is *β Auriga*, and nearly S. E. b. E., in a line between *Benetnasch* (the star in the point of the tail of the Great Bear) and *Deneb* (in the tail of the Lion), is *Cor Caroli*, distant from the latter 28°, and from the former 14½°; a line S. W. from *Cor Caroli* will nearly pass through *Arcturus*, at the distance of 25°. About 19° E. N. E. of *Arcturus* is *Alphacca*, the brightest star in the Northern Crown. A line from *Arcturus*, through the northern part of the Crown, will point out *Vega* in Lyra, at the distance of 59°. E. N. E. of *Vega* is *a Cygni;* these two latter stars, with the bright star *a Aquilæ*, or Altair in the Eagle, form a long triangle. The middle bright star is *Altair* or *a Aquilæ*, which is distant from *Vega* 34½°, and from *a Cygni* 37½°. From *a Cygni*, in a N. E. direction, and at the distance of 33°, is *β Cassiopeia*, and southward of both stars, nearly at the same distance from both, is *Scheat*, in Pegasus; these three stars forming a large triangle in the heavens. A little to the south of *Scheat* is *Markab*, or *a Pegasi*, in the constellation Pegasus; the four bright stars, *Scheat*, *Algenib*, *Alpheratz*, and *Markab*, which is the most southerly, forming nearly a square. Cassiopeia is a remarkable constellation, five bright stars in it forming a kind of W, nearly at the same distance from the Pole Star as the Great Bear on the opposite side.

A line from *β* Cassiopeia, and passing *a* Cassiopeia or *Schedir*, distant 5°, and forming the most southern angle of the W, and through *Almaach*, distant from *Schedir* 19½°, will lead to the little nebulous cluster Musca. About 13° W. S. W. of *Almaach* is *Mirach*, both in Andromeda; nearly E. from *Almaach*, at the distance of 12°, is *Algol*. N. N. E. of *Algol*, at 9½° distance, is *Algenib;* a line from *Algenib* through *Algol* will intersect Musca; *Algenib*, Musca, and the Pleiades, which are a little to the E. of Musca, will form a long triangle.

Fixed Stars in or near the Zodiac.

Nearly S. E. b. E. from the Pleiades, at the distance of 14°, is the bright red-looking star *Aldebaran*, in the constellation Taurus; the large star on the left is *Aldebaran*. 16° in a S. E. direction from this star is the beautiful constellation Orion. The two principal stars in Orion's shoulders are *Bellatrix*, which is 16° from *Aldebaran*, and

Betelgeux, which is 7½° from *Bellatrix*. In a S. W. direction, at 10° distance, are three stars of the second magnitude, nearly in a line with each other, called Orion's Belt; a line from *Betelgeux* through the middle star in the belt, will pass close to *Rigel*, which is 19° distant from *Betelgeux*. A line S. E. through the three stars in the belt, will cross *Sirius*, the Dog Star, one of the most brilliant in the heavens; at 23° distance from the centre star in the belt, N. E. of *Sirius*, at the distance of 23°, is *Procyon*. *Sirius*, *Procyon*, and *Betelgeux* form an equilateral triangle, and the two first being of the first magnitude, are easily recognized. A line from *Pracyon* nearly N. will intersect *Pollux*, distant 22½°; and 5° N. W. of *Pallux* is *Castor*. As you look N. W. is *Castor* on the left, and *Pollux* on the right. 37° E. b. N. from *Procyon* is *Regulus*, in the constellation Leo; the large star on the left is *Regulus*, and that on the right is *Deneb*. A line from *Pracyon* through *Regulus* will pass through *Deneb*, or β Leonis, and nearly in the same line is *Arcturus*, 35° from *Deneb;* S. E. 35° from *Deneb* is *Spica*, in the constellation Virgo; the great star on the right hand is *Spica;* this bright star, *Arcturus*, and *Deneb*, are nearly equidistant from each other, and form a large triangle. A line from *Regulus* through *Spica* will pass to the south of *Antares*, distant from the latter 45½°. *Antares* is the largest star in the constellation Scorpio, which appears in the heavens under this figure. About 14° N. E. b. E. from *a Aquilæ*, already mentioned, is the constellation Delphinus, known by four bright stars close together.

Nearly S. E. from *a Aquilæ*, and at the distance of 58½°, is *Fomalhaut*, in the constellation called Pisces, or the Southern Fish. A line from *a Aquilæ* through Delphinus will nearly cross *Scheat*, at the distance of 48½°. 13° S. from *Scheat* is *Markab;* 14° due E. from *Scheat* is *Alpheratz;* and nearly directly S. of *Alpheratz*, distant 14°, is *Algenib;* these four bright stars forming nearly a square. Nearly in a line between *Menkar* and Pleiades is *Arietis*, in the constellation Aries.

Southern Fixed Stars.

A line from *Aldebaran* through Rigel will nearly cross *a Colombæ*, distant from the latter 26½°, and, carried a little further, will pass *Canopus*, distant from Rigel 46°. *Canopus* is likewise nearly S. of Sirius, at the distance of 36½°. A line from Betelgeux through *Sirius*, at 73° distance from the latter star, is the beautiful Southern Cross, consisting of four bright stars, and well known to all who have navigated to the south. 10° E. from the centre of the Cross is *β Centauri*, and a few degrees further E. is *a Centauri*, both stars of the first magnitude, and easily mistaken for one another. To the E. of *a Centauri*, at the distance of about 42°, is Pavo, in the constellation Pavo; and about 40° E. of Pavo is *Achernar*.

As the earth, besides its *annual* revolution around the sun, makes a daily rotation upon its axis, the same alteration in the aspect of the heavens which may be observed in the period of a year, also takes place in the course of every twenty-four hours.

The Planets.

The planets for obtaining the Latitude and Longitude are easily distinguished from the fixed stars by their steady light, as they never, like the latter, twinkle, except when near the horizon. *Mars* may be known by ruddy complexion; *Jupiter* commonly appearing larger and refulgent; *Saturn* of a pale cast and feeble light, and sometimes resembling a star of the first or second magnitude.

Stars in distance for Lunar observations, will be perpendicular with the moon's horns, and their names can be ascertained by the lunar distances in our Almanac W. standing for west, and E. for east—then those stars or planets marked W. (for the day of the month you are on) are to the west of the moon, and those with an E. to the east.

Pegasi, Aldebaran, Pollux, Regulus, Fomalhaut, and Arietis are Lunar Stars.

DEFINITIONS.

The Horizon.—The visible horizon is that which is seen while the eye is elevated above the surface; and the sensible is that which is seen when the eye is on a level with the water. The depression of the former below the latter is called the dip of the visible horizon.

Terrestrial and Celestial Equators.—The Terrestrial Equator is a great circle supposed to be described around the earth, at an equal distance, or 90 degrees from the poles, dividing the globe into two equal parts; the part to the southward of the equator being called the southern hemisphere, and that to the northward the northern hemisphere.

The Celestial Equator, commonly called the Equinoctial, is an imaginary circle described in the heavens, corresponding to and coinciding with the sun's equator and poles.

Declination of a Celestial Object.—The declination of any celestial object is its distance north or south from the Equator, and is measured by that portion of the celestial meridian which is intercepted between the center of the object and the equator.

Zenith and Nadir.—The Zenith is that point in the heavens which is directly over the observer's head; and the Nadir that which is opposite to it—under his feet.

Vertical Circles.—Vertical Circles are circles supposed to be described in the heavens perpendicular to the horizon, and meeting at the Zenith. They are sometimes called circles of altitudes, circles of azimuths, and prime vertical circles.

Altitudes.—The Altitude of an object is that portion of a vertical circle which is intercepted between the center of the celestial object and the horizon.

Zenith Distance.—The Zenith Distance of a celestial object is equal to that portion of the vertical circle which is intercepted between the center of the object and the observer's zenith. It is always equal to the complement of the altitude, or 90 degrees.

Azimuths.—The Azimuth of an object is its true bearing, east or west, of its nearest meridian. It is always equal to that portion of the horizon which is intercepted between the vertical circle passing through the center of the object and the meridian of the place of observation.

Prime Vertical Circle.—The Prime Vertical Circle is the circle which passes from the zenith due east or west, having 90 degrees of the horizon intercepted between it and the meridian. All objects on this circle are said to be on the prime vertical.

Tropics.—The Tropics are two circles supposed to be described parallel to the equator, at the distance of about 23° 27′ 30″, equal to the highest declination. The northernmost is called the Tropic of Cancer, and the southern the Tropic of Capricorn, or the sun's north and south hemispheres.

Right Ascension.—The Right Ascension of a celestial body is that portion of the equinoctial which is intercepted by a celestial meridian passing through the center of the body and the first point of the ecliptic. It is generally given in time.

Right Ascension of the Meridian.—The Right Ascension of the Meridian is that part of the equinoctial that comes to the meridian with the object, measured from the first point of Aries.

Twilight.—Twilight is before and after sunrise and setting.

Refraction.—Refraction is a quantity by which a body appears above its true place in the heavens.

Parallax.—Parallax is the difference between an altitude taken at the surface of the earth, and that taken at the center at the same time. When the object is on the horizon, it is called the horizontal parallax; but in any other case it is called the parallax in altitude.

Time.—Time is measured by the apparent motion of a celestial body over the surface of the globe, and is called Solar, Lunar, or Sidereal, according to the body with which it is referred; a full revolution of either of these objects is called its apparent day, and begins when the object comes to the meridian; but for the convenience of civil and commercial business, that of the sun, called solar or civil time, is from midnight to midnight, the first twelve hours of which are marked A. M., signifying ante meridian, and the last twelve hours P. M., signifying post meridian. In this and the following mode of keeping time, the day is dated as soon as it commences.

Astronomical Day.—This day is also measured by the apparent motion of the sun; but for the convenience of astronomical computations, it is taken to begin at noon—that is, twelve hours after the beginning of the civil day—and end at noon of the following day. Astronomers generally reckon the hours of this day up to twenty-four hours, without any distinction of ante or post meridian, which they call astronomical time; hence the first twelve hours of which are the P. M. hours of the civil day on which it begins, and the last twelve hours of it are the A. M. hours of the day on which it ends.

The Nautical Day.—This day, as well as the civil and astronomical day, is measured by the apparent motion of the sun. It begins just with the astronomical day, but it is dated with the noon on which it ends; hence it is twenty-four hours in date later than the astronomical day—the first twelve hours of which are marked in the journal with P. M., and the last twelve hours with A. M., so that occurrences which happen on the afternoon of the civil day on which it begins, come in the journal under the date of the civil day in which it ends. The Log-Book is generally kept in Nautical or Sea Time, but it may be kept in Common or Civil Time.*

Equation of Time.—From the eccentricity of the earth's orbit, and the course of the earth round the sun, the meridians are not the same throughout the year; hence the apparent time deduced by observations or sun-dial is irregular, and requires to be corrected.

When time is deduced from observations of the sun, moon, or star, the *immediate* result is apparent time; to convert it into mean time, the equation of time is necessary, and it is to be applied to the apparent time according to the direction at the head of its column.

At page 106, for the month of August, we observed at the head of the column, $\frac{\text{added to}}{\text{subt. from}}$, which signifies that a change of declination occurs at the end of the month; and between the equations opposite the 31st of that month and the 1st of September, a

* There is no reason why this absurd system of keeping Sea Time should be continued, because it is just as easy to keep Civil Time, commencing the day at midnight, and the day's work could still be reckoned from noon to noon, as before. The only difference would be, that one half of it would appear in the preceding day's log (where it really belongs), and the other half in the following. Many logs are now kept on this principle.

black line indicates that the change occurs between the apparent noons of those days. The upper direction applies to all the quantities above the black line, and the lower direction to all the quantities below it.

Polar Distance of any celestial object, is an arch of a meridian, contained between the center of that object and the pole of the equinoctial; or, in other words, it is the distance of the object from the elevated pole.

Aberration.—An apparent change of place in the fixed stars, which arises from the motion of the earth combined with the motion of light.

Aphelion.—That point in the orbit of a planet in which it is at its greatest distance from the sun.

Apogeon.—That point in the orbit of a planet in which it is at its greatest distance from the earth.

Disk of the Sun or Moon is its round face, which, on account of the great distance of the object, appears flat, like a plane surface.

Diurnal.—Diurnal motions of the planets are the spaces they move through in a day.

Elongation.—The angular distance of a planet from the sun, as it appears to us upon the earth.

Emersion.—The time when any planet which is eclipsed begins to recover its light again.

Immersion.—The moment when an eclipse begins, or when a planet enters into a dark shadow.

Libration.—An apparent irregularity of the moon's motion, which makes her appear to librate about her axis in such a manner that parts of her eastern and western limbs becomes visible and invisible alternately.

Penumbra.—A faint shadow which accompanies an eclipse, and occasions a partial obscurity of the body to that part of the earth on which it falls.

Perigeon.—That point of a planet's orbit in which it is at its least distance from the earth.

Perihelion.—That point of a planet's orbit in which it is at its least distance from the sun.

Phases.—The several appearances of the moon and planets, according as a greater or less part of their illuminated hemispheres are presented to our sight.

To know whether the Time by Chronometer is P. M. or A. M. at Greenwich.

To the time of observation by watch, add the longitude of the ship in time if west, and subtract it if east, and the sum or difference will be the mean time at Greenwich. This, if less than twelve hours, will show the chronometer to be P. M. at Greenwich; but if more than twelve hours, the hours on the chronometer will be A. M. at Greenwich.

EXAMPLES.

February 22, 1858, when the time by chronometer was 1h. 30m. 35s., and in longitude 140° west, at 4h. 10m. 35s. P. M. by watch; required whether it be A. M. or P. M. at Greenwich.

					Longitude of ship 140°*
Time at ship	4h	10m	35s		4
Longitude in time . . .	9	20	0	add	
					60) 560 (9h 20m
Time in Greenwich . . .	13	30	35	equal 1h 30m 35s A. M.	

July 4, 1858, time by chronometer 9h. 40m. 15s., in longitude 160° east, at 8h. 20m. 15s. A. M. by watch; required whether it is A. M. or P. M. at Greenwich.

					160°
Time from the face of the watch, A. M. . . .	8h	20m	15s		4
Add :	12			for A. M.	
					60) 640 (10h 40m
Time at ship by watch	20	20	15	A. M.	
Longitude of ship in time	10	40	0	subtract in E. longitude	
Time at Greenwich	9	40	15	P. M.	

Observe, that as only twelve hours are given on the face of a chronometer, it shows only the time after noon or after midnight; therefore, when it shows A. M. at Greenwich, add 12 hours to it, and you will have the time since the preceding noon. If it shows P. M. at Greenwich, the noon of the present day will be the preceding noon at Greenwich; *for which the sun's declination must be found*, and corrected for the hour at Greenwich after that noon, when finding the longitude by chronometer.

N. B.—This method of reckoning time is out of place with common sense. A uniform method of reckoning time should be adapted for all purposes.

To find the Longitude by Chronometer from an Observed Altitude of the Sun.

RULES.

Take an altitude, or several altitudes of the sun, when it bears as nearly east or west as possible, but generally not less than *three hours* distant from the meridian,† noting by chronometer the corresponding times; of these altitudes and times take their means.

---

* To turn longitude into time, multiply degrees by 4 and divide by 60 (if above), will give hours and minutes; multiply miles by 4 will give seconds.

† When the latitude and declination are of contrary names, the best time to observe is when the object is between 6° and 10° high.

To the mean of the times of observation, apply the *original error*—that is, add what the chronometer was too slow, and subtract what it was too fast for Greenwich time—gives the time by chronometer corrected for the original error.

Multiply the *daily rate* by the number of days and parts of a day that have elapsed since the rate was ascertained, gives the whole accumulated rate; which add to the above corrected time, if the chronometer be losing, and subtract it, if gaining, gives the true Greenwich time by chronometer.

Take out the sun's declination and the equation of time for the preceding noon from this Almanac, and reduce them to mean time by the "Diff. for 1 hour," in the next column to them;* also find the sun's polar distance.† Then, with the true altitude of the sun, the *true latitude of the ship*, and the sun's polar distance, the true time at ship is readily ascertained; the difference between which and the true time at Greenwich is the longitude of the ship‡ at the time of observation (in time), which will be east, if the time at ship be greater than the Greenwich time, and west, if it be less.

EXAMPLES.

August 19, 1858, the following altitudes of the sun and corresponding time was observed. Required the mean of each?

	Altitudes.	*Times.*	
	40° 07′	6° 58′ 40″	P. M.
	43 57	6 59 36	
	43 44	7 00 1	
Number of observations . . .	3) 131 48	3) 20 58 17	
Mean of altitudes	43 56	6 59 25	Mean of chronometer times.

April 5, 1858, in latitude 48° 45′ N., at P. M., the mean of several obs. altitudes of the sun's lower limb was 9° 5′ 42″, and that of the corresponding times 9h. 38m. 54s. P. M. by a chronometer, whose error and rate had been determined at noon, January 1, when it was found to be 4m. 40s. too fast for Greenwich time, and gaining 1s. 8-tenths daily; height of the eye above the level of the sea 20 feet. Required the longitude of the ship?

* This method of correcting the declination and equation for the Greenwich time by the "Diff. for 1 hour," from the Nautical Almanac, is much easier and more correct than the old method of correcting by tables. If it is near noon at Greenwich, or the "Diff. for 1 hour" is small, we see at once that no correction is required.

† *If the latitude of the ship and sun's declination be both* north *or both* south, subtract *the declination from* 90° *gives the* polar distance; and if one be north *and the other* south, add *the declination* to 90° gives the polar distance.

‡ Observe that if one be P. M. and the other A. M. the same day, you must add 24 hours to that at P. M. and subtract them; and if the P. M. and A. M. times fall on different dates, their difference, counting from their preceding noons, is the longitude of the ship.

Mean of Chronometer Times . .	9h 38m 54s P. M.	Days from Jan. 1st to April 5th is . . 9·4
Original error (too fast)	—4 40	Daily rate to multiply . . . . . . 1·8
	9 34 14	752
Whole accumulated rate (gaining)	—2 50	94
True Time at Greenwich . . .	9 31 24 P. M.	60) 169·2

Chronometer accumulated in 94 days	2′ 49″ ·2
Chronometer accumulated in 9h 38m equal 10h. As 24h : 1s 8 : : 10h—(to add) . . .	7
Whole accumulated rate for 94 days and 10 hours	*2′ 49″ ·9
Sun's observed altitude of lower limb	9° 5′ 42″
Correction of altitude, to add	5 54
Sun's true altitude	*9 11 34
Sun's "Apparent Declination," April 5th, is	6° 4′ 18″N.
With "Diff. for 1 hr." 56″·8, *abreast of decl.*, mult. by the 10h. gives correction . . .	†+9 28
Sun's true declination at Greenwich time	6 13 46
	90 0 0
Sun's Polar Distance	83 46 14
Equation of time, April 5th.	2m 45s ·51
With "Diff. for 1 hr." 0′·731, abreast of equat., mult. by 10h. gives correction	‡ —7 ·31
True equation of time at Greenwich	§ 2 38 ·14

Sun's true altitude	9° 12′		
True latitude of ship at observation . .	48 45	Secant . . .	0·18089
Sun's polar distance	83 46	Co-secant . .	0·00258
Sum	2) 141 43		
Half-sum	70 51	Co-sine . . .	9·51593
Sun's true altitude—to subtract . . .	9 12		
Remainder	61 39	Sine	9·94451

Apparent time at ship 5h 32m 39s P. M. . . . . =9·64391
Equation of time . 2 38 to add, as directed in the N. A.

Mean ship time at obs. 5 35 17 P. M.

Mean time at Greenwich at obs. 9h 31m 24s P. M.
Mean time at the ship do. 5 35 17 P. M.

Longitude of ship at observation 3 56 7 = 59° 1′¾ W. from Greenwich.

* When the tenths are over five, add one second; and when the seconds are over thirty, add one minute; and when the hundredths are over forty-nine, add one second.
† Add the corrections when the declinations are increasing, and subtract when decreasing.
‡ Add the correction for equation of time when it is increasing, and subtract it when decreasing.
§ When the tenths are over five, add one second; when the hundredths are over forty-nine, add one second; and when the seconds are over thirty, add one minute.

To find the Longitude by the Sun's Rising or Setting.

RULE.

Observe the sun to set or rise with a spyglass, and note the time by chronometer.

If the lower limb is observed, *subtract* 21 minutes from the sum of the latitude and polar distance, and *add* 21 minutes to the half-sum, and call it the remainder.* For the upper limb *subtract* 53 minutes from the sum, and *add* 53 minutes to the half-sum.

EXAMPLES.

January 31, 1858, at P. M., in latitude 49° 49′ N., observed the sun's lower limb to set, when the corresponding time by chronometer (corrected for error and rate) was 10h. 58m. 35s. P. M., the height of the eye being 18 feet. Required the longitude of the ship at the sun's setting?

Sun's declination, January 31 .	17° 22′ 31″S.	"Diff. for 1 hr."	42″·4
Correction. Subtract . . . . †	7 46	Hour of observation	×11
Sun's true declination . . . . ‡	17 14 45 S.		60) 466·4
	90 0 0	Correction	7′ 46″·4
Sun's polar distance	107 14 45		
Equation of time, January 31 .	13m 44s	"Diff. for 1 hr."	0″·342
Correction. Add	§4	Hour of observation . . .	×11
True equation of time . . . . ‡	13 48	Correction	3·762, equal 4·

True latitude of ship at the sun's setting .	49° 49′	Secant . . .	0·19028
Sun's polar distance	+107 15	Co-secant . .	0·01999
Sum	157 4		
Correction	*21		
	2) 156 43		
Half-sum	78 21	Co-sine . . .	9·30521
Correction	*+21		
Remainder	78 42	Sine	9·99150

Apparent time at ship 4h 36m 16s P. M. . . . . = 9·50698
Equation of time . 13 48 to add, as directed in the N. A.

Mean time at ship . 4 50 04
True time at Greenwich when the sun sets 10h 58m 35s P. M.
True time at ship when the sun set . . 4 50 04 P. M.

Longitude of ship when the sun sets . . 6 8 31 = 92° 08′ W.

* The correction for the sun's refraction. Semi-diameter and height of the eye above the level of the sea.

Sun's refraction, for alt. 00 deg.	33· 00··		33· 00··
Sun's semi-diameter, January 1, N. A. Subtract	16 17		16 17
	16 43		4 11
Height of the eye (18 feet) to add	4 11		
For the sun's lower limb	20 54 = 21·	For the sun's upper limb	53 28

† For the declinations are decreasing.
‡ For the time of the sun's setting.
§ For the equations are increasing.

Longitude obtained from morning altitudes and brought on to noon, very seldom agrees with the longitude obtained from afternoon sights, and reduced back to noon. This is supposed to be caused by unequal refraction, together with errors in the observed altitudes, errors in the instruments, and that of an incorrect latitude, used in the computation.* But it not unfrequently happens that the difference in the longitude thus obtained is caused by the omission of the correction for Declination and Equation of Time. The "Diff. of Dec. in 1 hour" is sometimes 57″, and "Diff. of Equa. in 1 hour," 1 second 2-tenths; this in 8 hours (the time that usually elapses between the A. M. and P. M. sights) would make a difference of 8 miles in the declination, and 10 seconds in equation of time. Now, it is plain that if the same dec. and equa. were used for both observations, it would make a difference of 11 miles at least in the longitude deduced from those sights, and brought on to noon.

Trade Winds.

This rarefaction of the air mostly takes place in the greatest degree about the equator, the sun's heat being there the greatest; and were the winds from the N. and S. thus occasioned, not diverted from meeting at that place, it would exhibit a continual scene of whirlwinds, hurricanes, rain, lightning, thunder, etc. But fortunately the intervention of another natural power prevents this. The sun in moving over the equatorial regions from E. to W. rarefies the air as it passes, and causes the denser eastern air to flow westward, in order to restore the equilibrium. With this wind the winds from the N. and S. combine about the tropics, and form what are called trade winds. The combination of these two winds N. and E., produces a constant N. E. wind; and that of the two winds S. and E., produces a regular S. E. wind. These winds extend about 30° on each side of the equator.

Limits of the N. E. and S. E. Trade Winds near the Equator, in different Months of the Year.

Months.	*Lost N. E. Trade Outward, in*		*Got N. E. Trade Homeward, in*		*Mean out and Home.*	*Lost N. E. Trade Homeward, in*		*Got S. E. Trade Outward, in*		*Mean out and Home.*	*Diff.*
	Latitude.	Mean.	Latitude.	Mean.		Latitude.	Mean.	Latitude.	Mean.		
	° °	°	° °	°	°	° °	°	° °	°	°	°
January . .	5 to 10 N.	7 N.	3 to 6 N.	4½ N.	5¾ N.	½ to 4 N.	2½ N.	2 to 4 N.	3 N.	2¾ N.	3†
February . .	2 10	7	2 7	5	6	2 S. 3	1½	½ 1	1	1¼	4¾
March . . .	2½ 8	5½	2 7	5	5½	1 2	1	½ 2½	1½	1¼	3¾
April . . .	4 9	6	4 8	5½	5¾	2 2½	1	0 2½	1½	1¼	4½
May	5 10	7	4½ 7	6	6½	1 N. 4	2½	0 4	3	2¾	3¾
June . . .	7 13	9	7 12	9	9	1 5	3	0 5	3	3	6
July	8½ 15	12	11 14	12	12	1 6	4	1 5	3	3	8½
August . . .	11 15	13	11 14½	13	13	3 5	4	1 4	2½	3¼	9¾
September . .	9 14	11½	11 14	12	11¾	2 4	3½	1 3	2	3	8¾
October . . .	7½ 13	10	8½ 14	10	10	2 5	3	1 5	3	3	7
November . .	6 11	9	7 0	7	8	3 4	3½	3 5	4	3¾	4¼
December . .	5 7	6	3 6	5	5½	1 4	2½	1 4½	4	3¼	2¼

* If the latitude of the ship is not known in working for the time, the longitude will be far from the truth, and previous to the introduction of "Sumner's Method," the "Chronometer Sights" were considered worthless, unless the latitude could be obtained; but by his method, a ship's position may be found, if two altitudes (within an hour or more of each other) can be observed for the longitude by chronometer, although the latitude may be considerably in error. This work will be found a valuable assistant to the navigator, especially in high latitudes, when the observations for latitude are generally uncertain.

† Difference of the two Mean Limits of N. E. and S. E. Trades.

The preceding observations are rather few in number for some months to obtain a correct mean; but the first column, showing the extreme limits of each, will be most useful to refer to, as it marks the situation where the Trades may reasonably be expected to fail or commence.

The numbers in the last column are the space of variable winds, etc., between the limits of the trades. The column of means exhibits the limits experienced by numerous vessels. Calms and variable winds are also experienced during every month in the year in the space between the trades; the former seldom continue long, the vicinity of the N. E. trades being most liable to them. Sudden squalls often follow calms, which must be observed with care, as they give very little warning. They are sometimes accompanied with whirlwinds, in their first resistance against the resisting atmosphere, and will blow strong for one or two hours.

The S. W. and W. S. W. winds, with much rain, often prevail in July and August, and sometimes in June and September, blowing towards the coast of Guinea, and sometimes as far north as the Cape Verd Islands. These are called by the Guinea traders the *Western Monsoons.*

Great Circle Sailing.

An arc of a great circle is the shortest distance between any two places. The parallels of latitude are small circles that divide the globe into two unequal parts. If two places are situated exactly opposite to each other on different sides of the Atlantic, both being on the same parallel of N. latitude, the shortest way to go from one to the other, is not to sail due E. or W., but to direct your course from the first half a little N. of E. or W., and then again curving down to the S., describing the arc of a great circle, uniting the two places, and the further N. or S. the two places are, the greater will be the gain by sailing in a great circle. Between New York and England it makes a difference of one hundred miles, if N. of 45°; if S. of 45°, no saving, but a loss of distance.

Latitude by the Polar Star.

Of all the heavenly bodies, the Polar Star is best calculated for finding the latitude in the northern hemisphere; because a single altitude, taken at any hour of the night by a careful observer, will give the latitude to a sufficient degree of accuracy. This is true if you measure the altitude where it is without horizou by the *altimeter.*

The Barometer.

This useful instrument being of leading importance to the mariner for measuring the weight of the air, and the variations of its pressure, in order to determine the changes in the weather, the heights of mountains, etc., we insert the following valuable directions by Mr. Patrick:

The changes of the weather seldom produce a variation in the height of the mercury which passes the limits of 28 and 31 inches, which is therefore a sufficient length for the graduated scale, but to use the barometer as a weather-glass, several particulars must be attended to:

1st. The rising of the mercury presages, in general, fair weather, and its falling, the contrary—as rain, snow, high winds, and storms.

2d. In very hot weather, the falling of the mercury indicates thunder.

3d. In winter, the rising presages frost; and in frosty weather, if the mercury falls three or four divisions (tenths of an inch), there certainly will follow a thaw; but in a continued frost, if the mercury rises, there will be snow.

4th. When foul weather happens soon after the fall of the mercury, expect but little of it; and, on the other hand, little fair weather may be expected, when it becomes quickly fair after the rising of the mercury.

5th. In foul weather, when the mercury rises much and high, and so continues two or three days before the foul weather has gone away, then a continuance of fair weather may be expected.

6th. In fair weather, when the mercury falls much and low, and continues so for two or three days before the rain comes, then a great deal of wet and high winds may be expected.

7th. The unsettled motion, or frequent rising and falling of the mercury, denotes changeable weather.

8th. The words on the plates are not so strictly to be observed as the rising and falling of the mercury, for if it stand at "Much Rain," and then rise to "Changeable," it presages fair weather, though not to continue so long as though the mercury had risen higher; and so, on the contrary, if the mercury stand at "Fair," then fall to "Changeable," it presages foul weather, though not so much as if it had sunk lower.

From this it appears that it is not from the point at which the mercury may stand that we are to form a judgment of the state of the weather, but from its being in a state of rising or falling; therefore it is necessary to attend to the following directions:

1st. If the mercury is in a rising state, it stands higher in the middle of the tube than at the sides.

2d. If the middle is hollow, it indicates its fall.

3d. If level, it is steady.

4th. Before observation, gently tap the barometer near the top, as the mercury will occasionally, where the tubes are small, slightly hang to the sides of the glass, and prevent its predicting any very delicate change which may have taken place in the air.

The following explanation of the scale and vernier, and examples to show the manner of reading them, may be of use:

The scale is divided into inches and tenths, and again, by means of the vernier, subdivided into hundredths of an inch; the observations are, therefore, better made from the figures than the words.

Example 1.—Suppose the mercury to stand *nearly a tenth* above 30, turn up the vernier till the top stands even with the surface of the mercury, and observe which of its divisions or figures exactly coincides with any one of the divisions on the barometer scale; suppose 9 on the vernier to agree with one of the lines, the height of the mercury as then shown will be 30 in. ·09—that is, 30 inches and 9-hundredths of an inch from the level of its surface in the cistern.

Example 2.—Suppose the mercury to stand a little below the 30, but not a tenth below, set the top of the vernier level with the mercury, and suppose 6 on the vernier to coincide with one of the lines on the barometrical scale, the height of the mercury will then be 29 in. ·96 (hundredths), or rather more than 9½-tenths above 29 inches.

The greatest height of the mercury is observed when an easterly or northerly wind prevails. Within the tropics and near them, it does not vary more than from 1 to 3-tenths; this being the case, greater care should be taken in noticing the observations.

THE END.

First Principles for finding Longitude by Chronometer time on all parts of the Globe. —

Sat.n by Hall Colby.

Any two of the Fixed Stars being perpendicular to each other on, or near the Equator; bearing due south, constitute a perfect Meridian for finding Longitude once in 24 hours, to all parts of the Earth. As Illustrated by this device

Jupiter

The Sun on Meridian

Mars.

The Earths motion on her axis from West to East is 4 minutes to a Degree, or 15 Degrees to the Hour. The Meridian passage of the Sun, Moon, or Stars, at Greenwich forms a standard by Chronometer time of Greenwich for finding Longitude on any part of the Globe